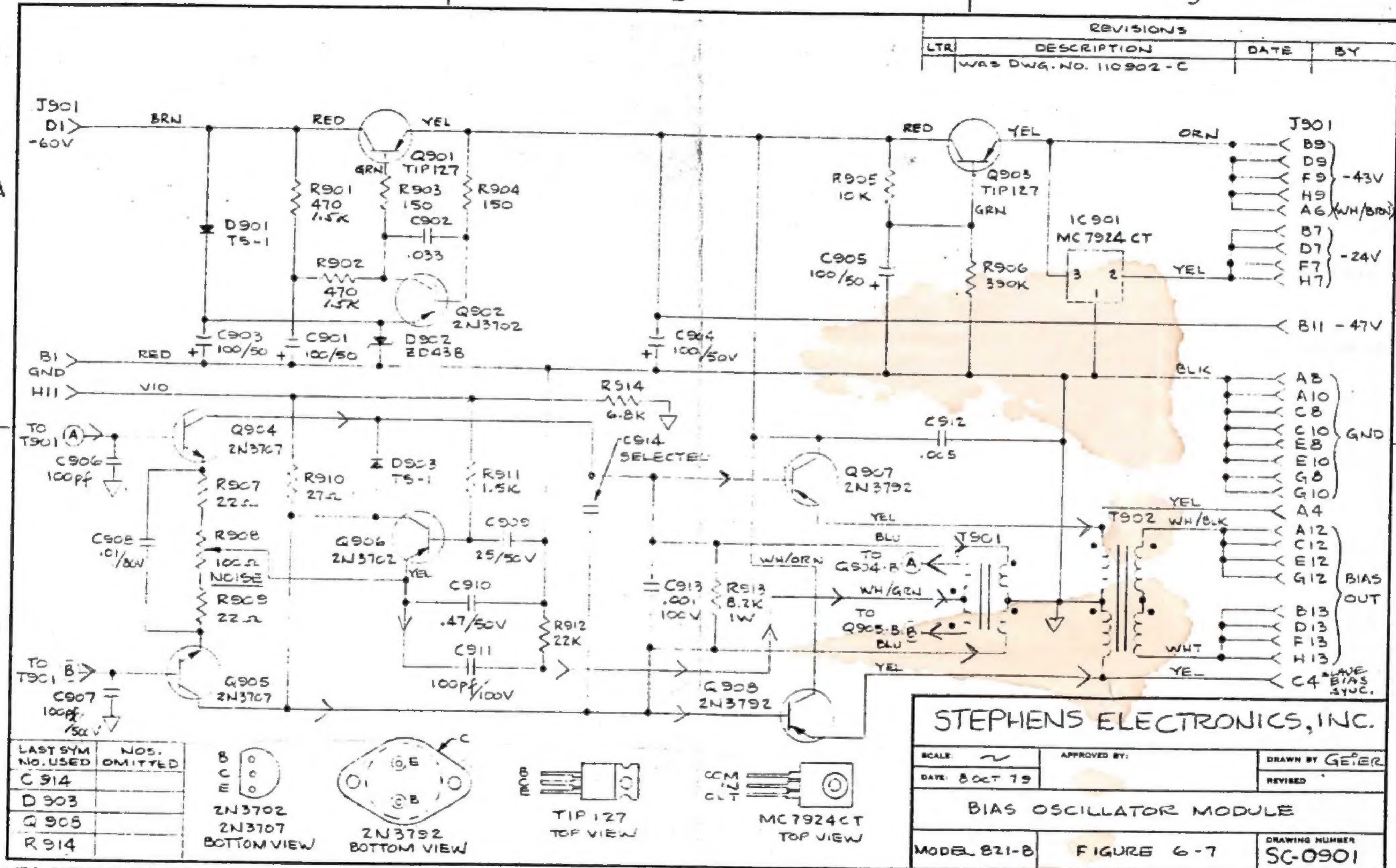
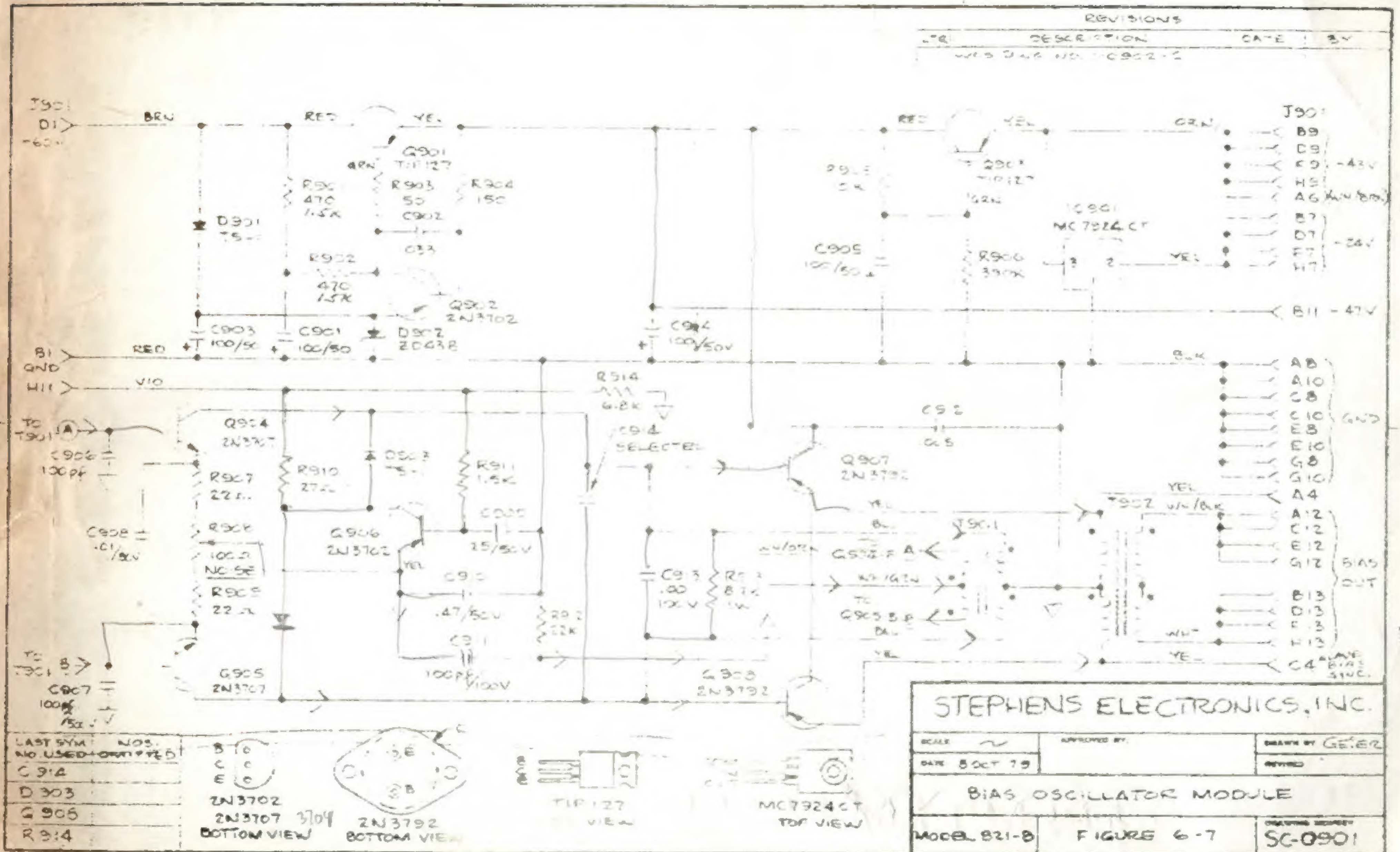
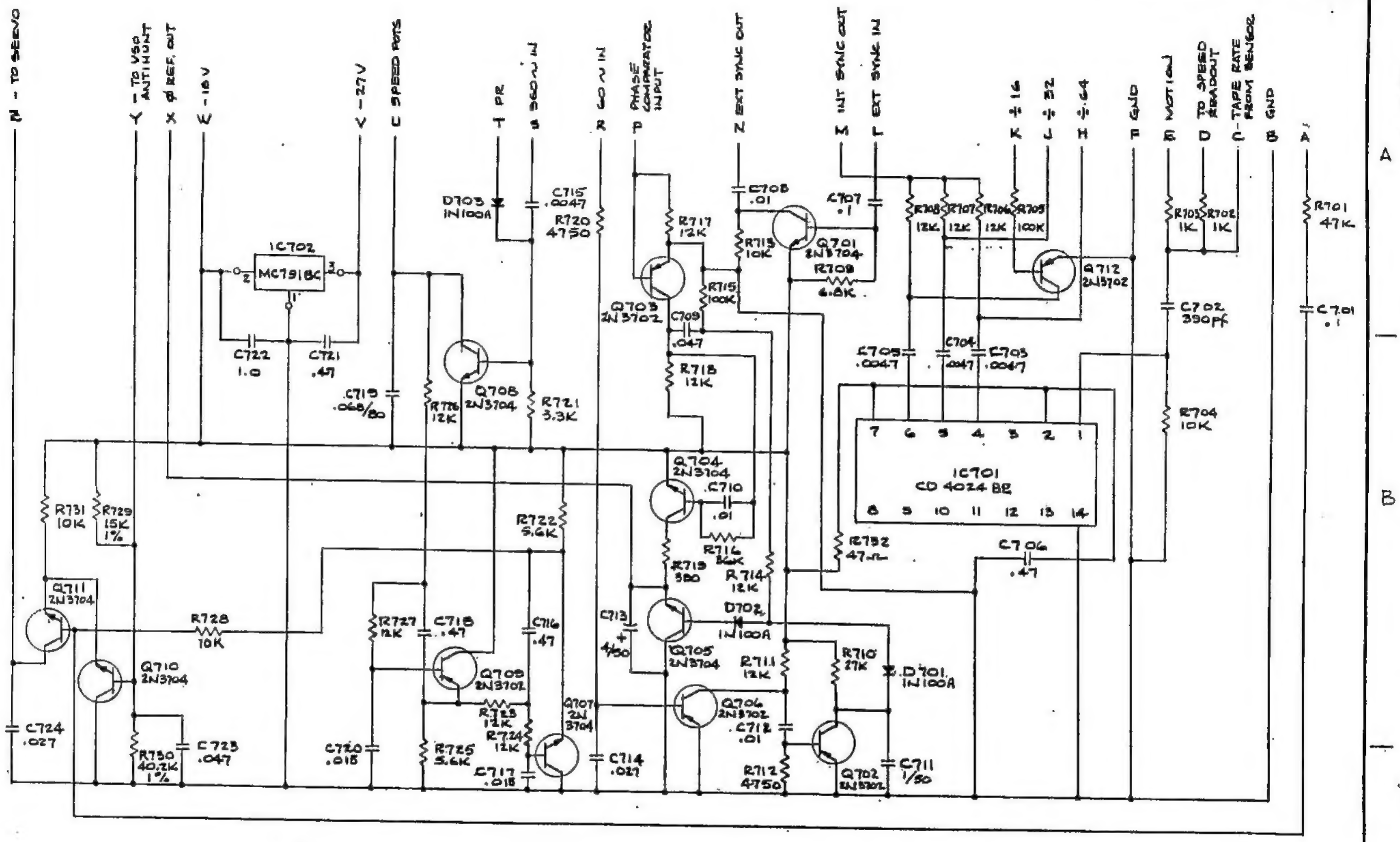

REVISIONS
LTR
DESCRIPTION
DATE
BY
WAS DWG. NO. 110902-C
J901
D1 -60V
BRN
RED
YEL
Q901 TIP127
GRN
R901 470 1.5K
R903 150
R904 150
C902 .033
D901 TS-1
R902 470 1.5K
Q902 2N3702
D902 ZD43B
C903 100/50
C901 100/50
C904 100/50V
B1 GND
H11
V10
R914 6.8K
R905 10K
Q903 TIP127
C905 100/50
R906 390K
IC901 MC7924CT
B9 D9 F9 H9 A6 -43V (WH/BRN)
B7 D7 F7 H7 -24V
B11 -47V
BLK
A8 A10 C8 C10 E8 E10 G8 G10 GND
TO T901 A
C906 100pf
Q904 2N3707
D903 TS-1
R910 27Ω
R911 1.5K
C914 SELECTED
C912 .005
Q907 2N3792
R907 22Ω
R908 100Ω NOISE
R909 22Ω
C908 .01/80V
Q906 2N3702
C909 25/50V
C910 .47/50V
C911 100pf/100V
R912 22K
C913 .001 100V
R913 8.2K 1W
WH/ORN
BLU
TO Q904-B A
WH/GRN
TO Q905-B B
T901
T902
WH/BLK
A4
A12 C12 E12 G12 BIAS OUT
B13 D13 F13 H13
WHT
C4 SLAVE BIAS SYNC.
TO T901 B
C907 100pf /50V
Q905 2N3707
Q908 2N3792
LAST SYM NO. USED
NOS. OMITTED
C 914
D 903
Q 908
R 914
B C E
2N3702 2N3707 BOTTOM VIEW
C E B
2N3792 BOTTOM VIEW
B C E
TIP127 TOP VIEW
COM IN OUT
MC7924CT TOP VIEW
STEPHENS ELECTRONICS, INC.
SCALE ~
APPROVED BY:
DRAWN BY GEIER
DATE 8 OCT 79
REVISED
BIAS OSCILLATOR MODULE
MODEL 821-B
FIGURE 6-7
DRAWING NUMBER SC-0901



REVISIONS
LTR
DESCRIPTION
DATE
BY
STEPHENS ELECTRONICS, INC.
SCALE
APPROVED BY
DRAWN BY GEIER
DATE 8 OCT 79
REVISED
BIAS OSCILLATOR MODULE
MODEL 821-B
FIGURE 6-7
SC-0901
LAST SYM. NO. USED
C 914
D 303
Q 906
R 914
2N3702
2N3707
BOTTOM VIEW
2N3792
BOTTOM VIEW
TIP127
MC7924CT
TOP VIEW
Q901
TIP127
Q902
2N3702
Q904
2N3707
Q905
2N3707
Q906
2N3702
Q907
2N3792
Q908
2N3792
MC7924CT
J901
SELECTED
BIAS OUT
GND

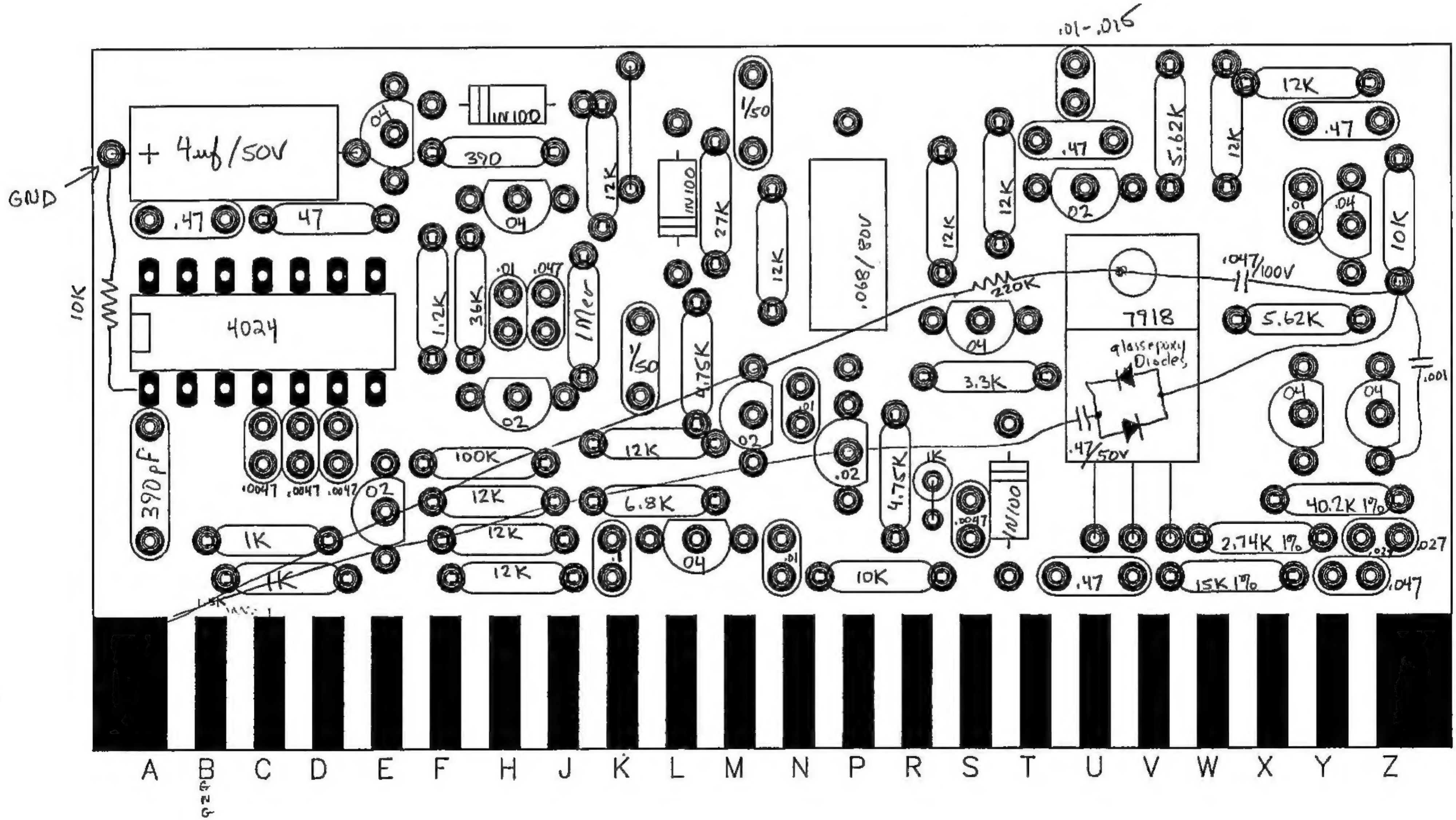


All capacitors 50 volt and in microfarads
All resistor 1/4 watt

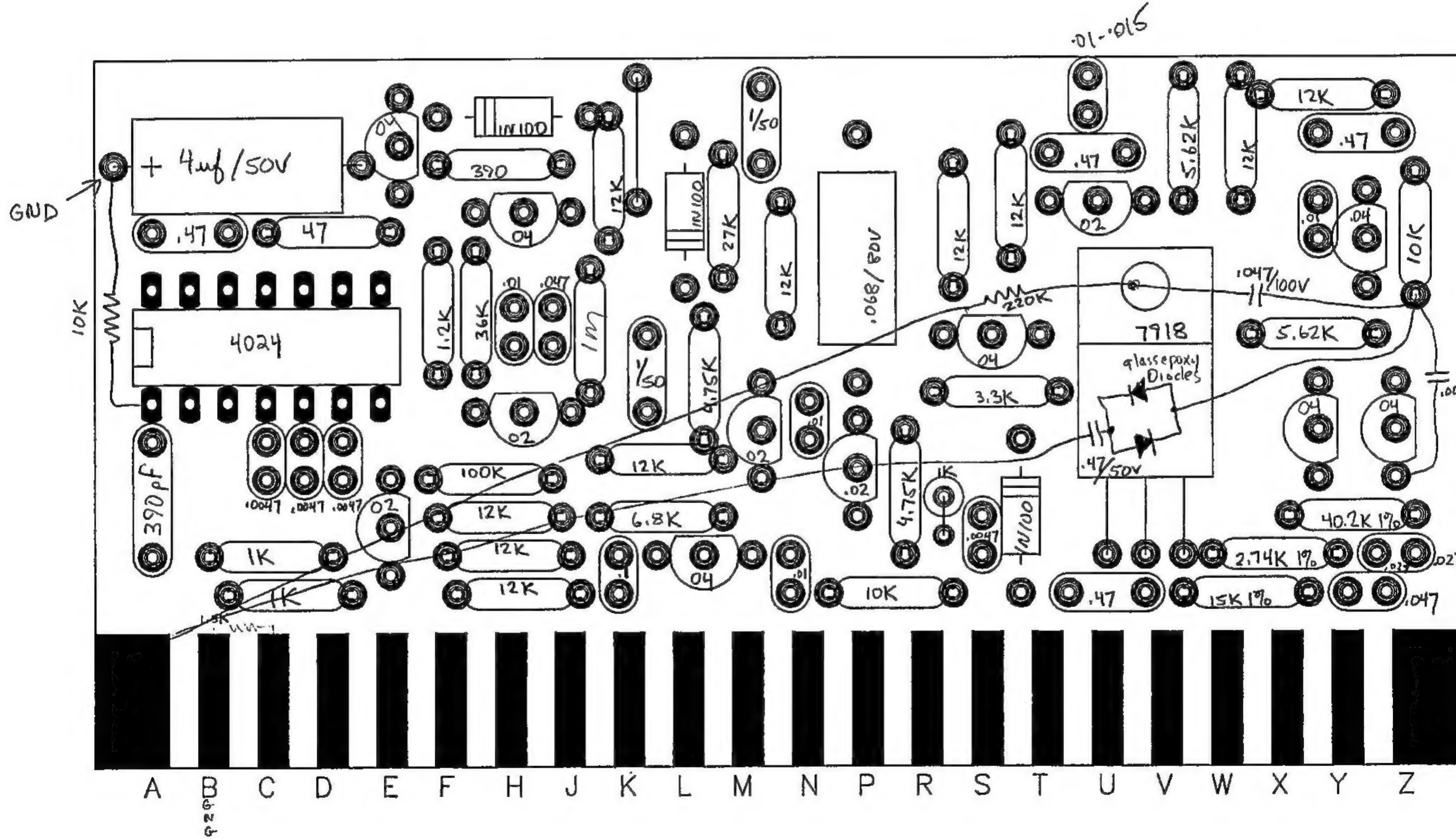
STEPHENS ELECTRONICS, INC.

SCALE: —	APPROVED BY:	DRAWN BY Geiger
DATE: 17 APR 78		REVISED 8-28-80
SCHEMATIC CONVERTER CARD - 310164.A		
MODELS 103A-104A	FIGURE 6-11	DRAWING NUMBER

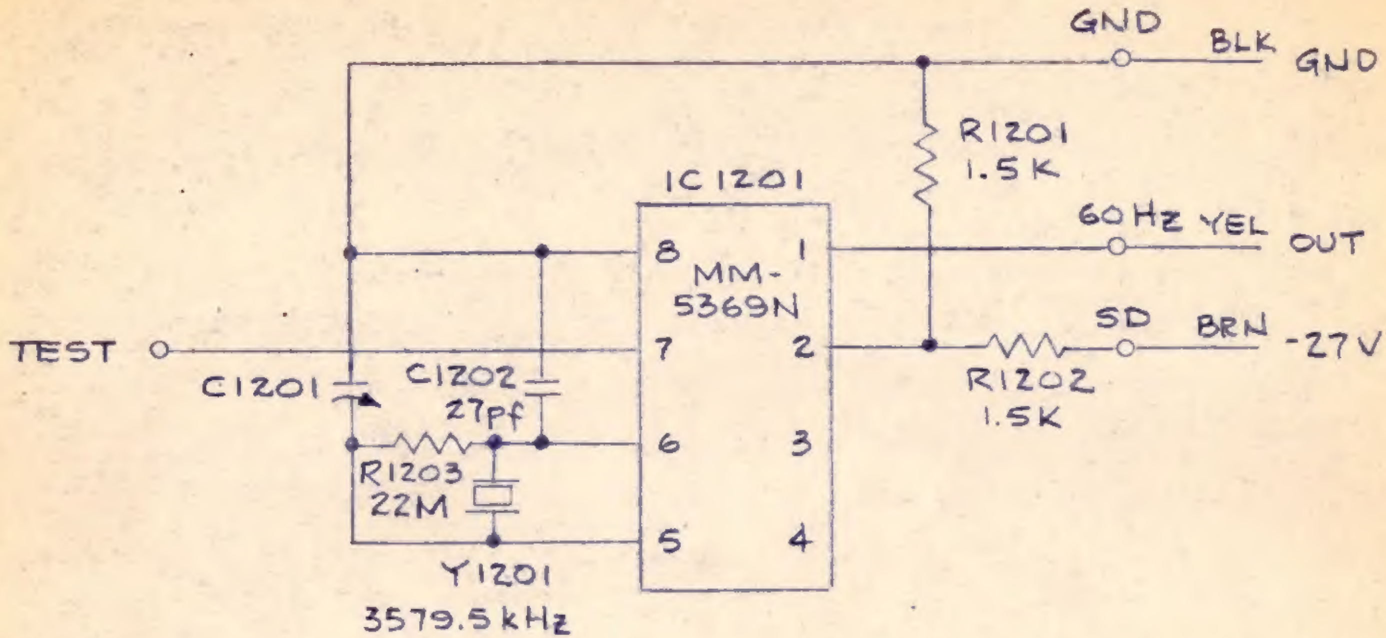
CONVERTER


GND
10K
+ 4uf/50V
.47
47
390
1N100
12K
27K
1/50
.068/80V
4024
1.2K
36K
.01
.047
1Meg
4.75K
12K
220K
7918
.047/100V
5.62K
glassepoxy Diodes
.47/50V
.001
10K
.01-.015
.47
02
04
3.3K
390pF
.0047
100K
6.8K
1K
10K
1N100
40.2K 1%
2.74K 1%
15K 1%
.027
.047
A B C D E F H J K L M N P R S T U V W X Y Z
GND

CONVENTER


.01-.015
GND
+ 4uf/50V
04
IN100
390
12K
1/50
27K
.068/80V
.47
5.62K
12K
.47
10K
.01
.04
02
.47
47
10K
4024
1.2K
36K
.01
.047
1M
4.75K
220K
7918
.047/100V
5.62K
glassepoxy Diodes
.001
3.3K
.01
.02
1K
4.75K
.47/50V
390pF
.0047
.0047
.0047
100K
6.8K
12K
12K
12K
1K
1K
1.5K
.1
.01
10K
.0047
40.2K 1%
2.74K 1%
.027
15K 1%
.047
A B C D E F H J K L M N P R S T U V W X Y Z
GNG

REVISIONS			
LTR	DESCRIPTION	DATE	BY

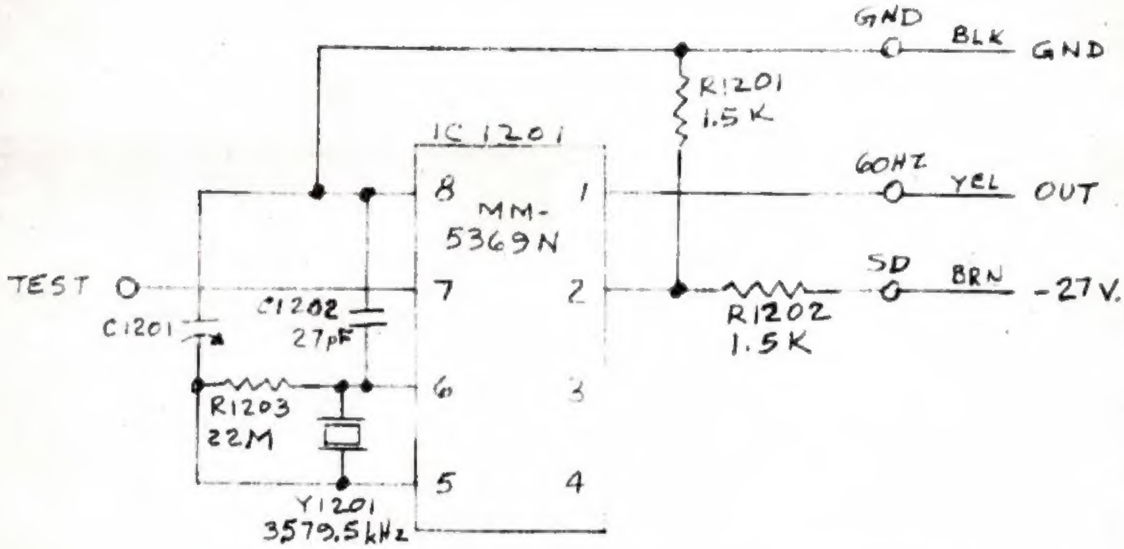


THIS SCHEMATIC APPLIES TO MACHINES UP TO AND INCLUDING SN 1064

FIGURE 6-13

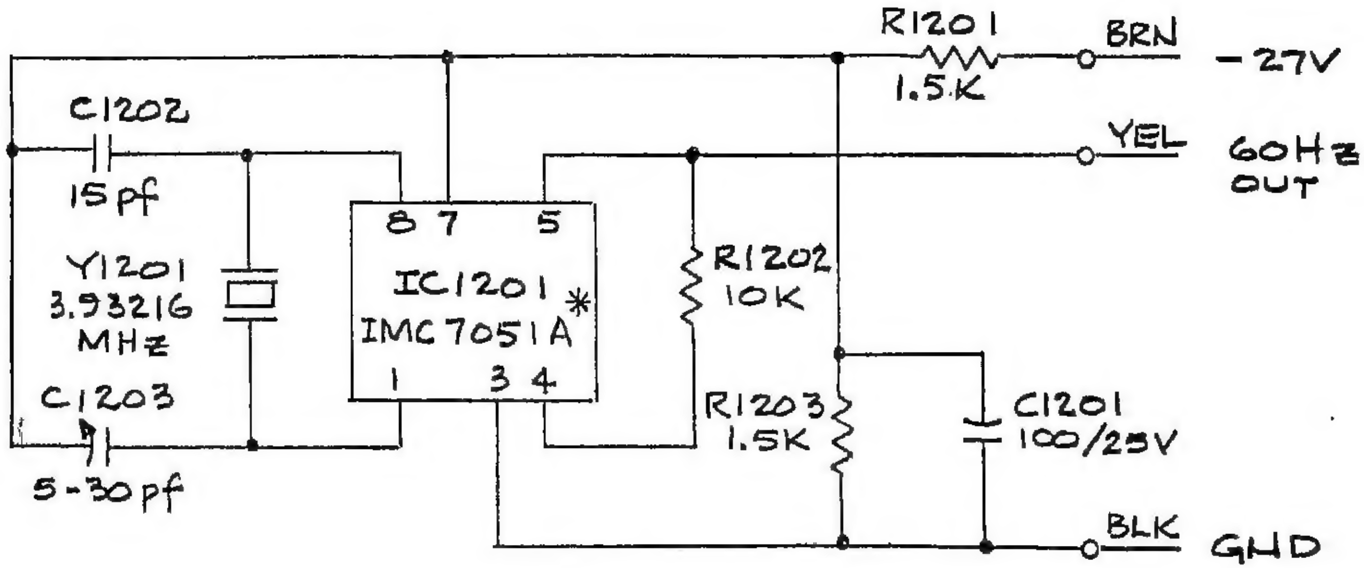
STEPHENS ELECTRONICS, INC.		
SCALE: ~	APPROVED BY:	DRAWN BY GEIER
DATE: 19 SEP 79		REVISED
CRYSTAL FREQUENCY CONTROL CARD		
MODEL 821-B	FIGURE 6-13	DRAWING NUMBER REV. SC-1201

REVISED 3/19/79



SCHEMATIC, CRYSTAL FREQUENCY CONTROL CARD

REVISIONS			
LTR	DESCRIPTION	DATE	BY



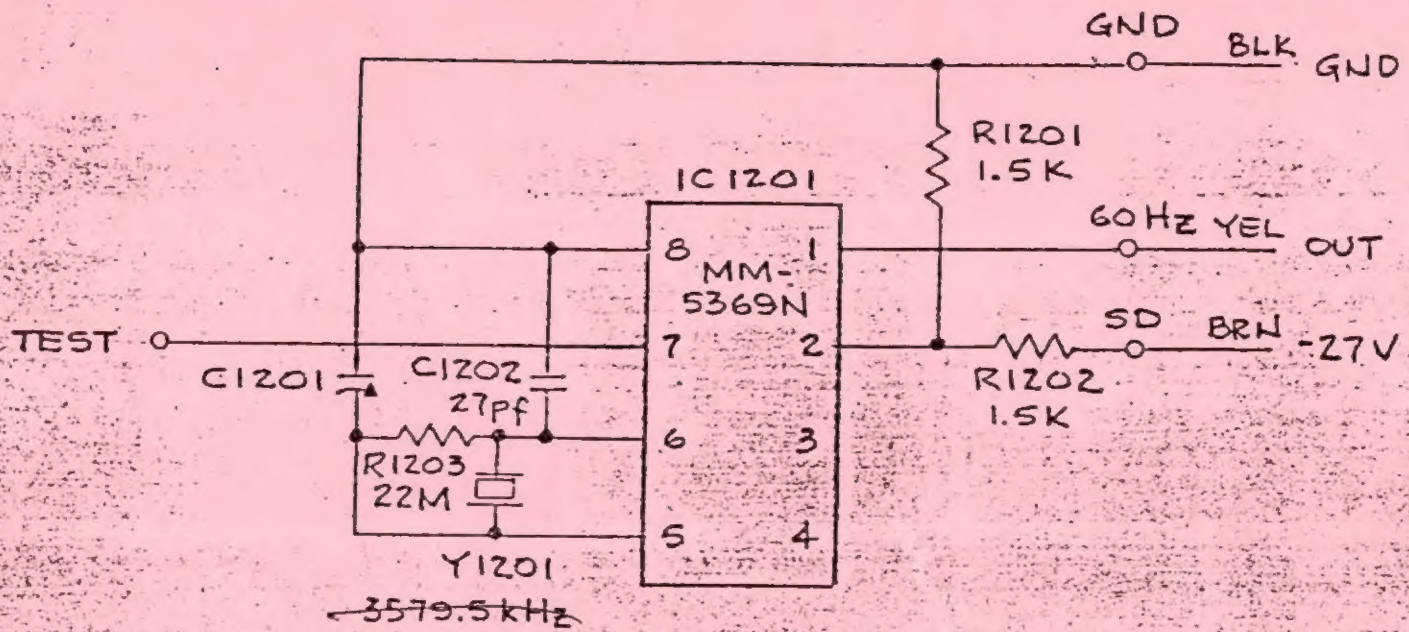
* ALTERNATE: ITS 9042-1

USED ON SN 1065 AND UP

FIGURE 6-13

STEPHENS ELECTRONICS, INC.		
SCALE: —	APPROVED BY:	DRAWN BY GEIER
DATE: 20 OCT 79		REVISED
CRYSTAL FREQUENCY CONTROL CARD		
MODEL 821-B	FIGURE 6-13	DRAWING NUMBER SC-1202

REVISIONS			
LTR	DESCRIPTION	DATE	BY



3,5795 MEG XTAL

FIGURE 6-13

92

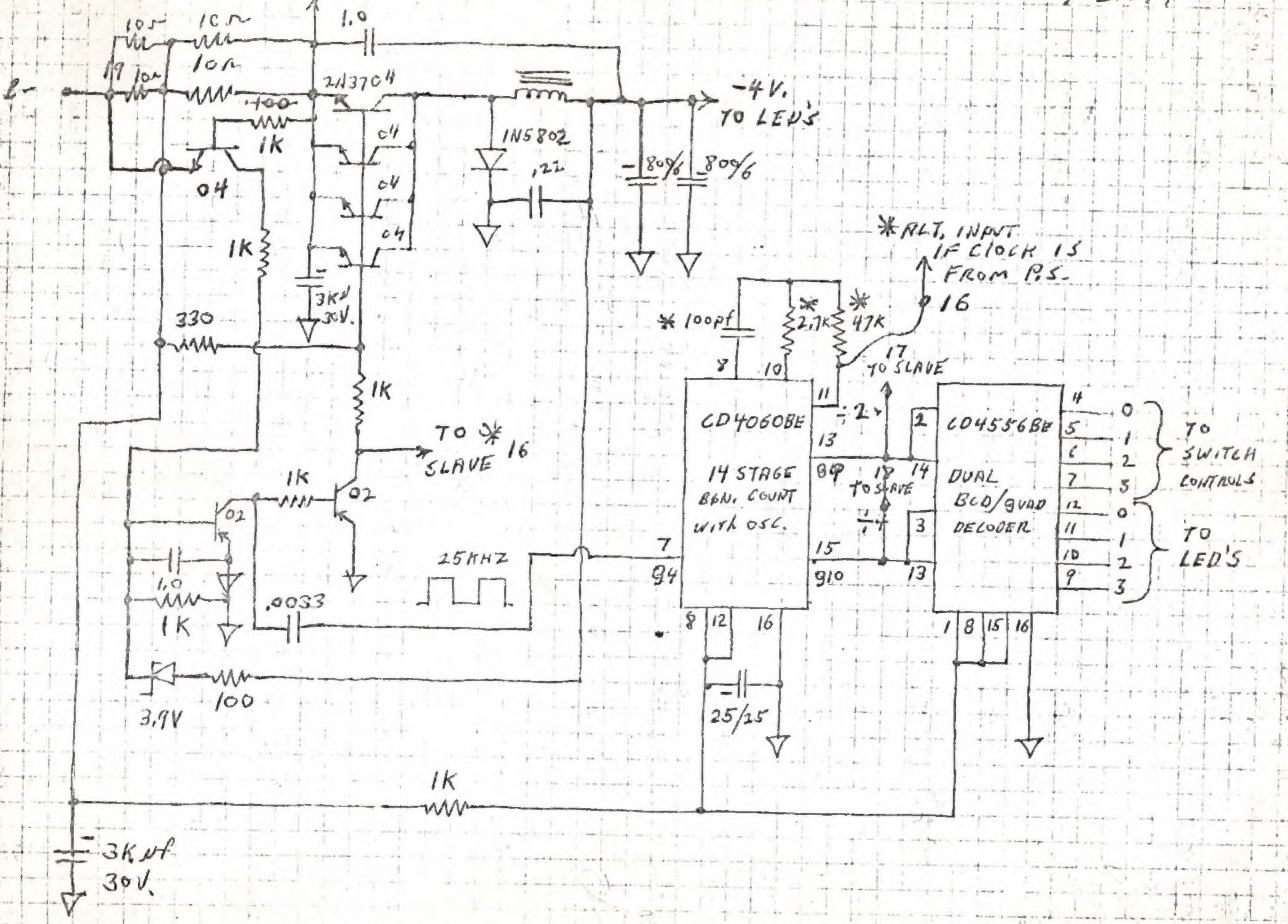
~~Andy Hope this Helps Bob~~

STEPHENS ELECTRONICS, INC.		
SCALE: ~	APPROVED BY:	DRAWN BY GEIER
DATE: 19 SEP 79		REVISED
CRYSTAL FREQUENCY CONTROL CARD		
MODEL 821-B	FIGURE 6-13	DRAWING NUMBER REV. SC1201

8½X11 PRINTED ON NO. 1000H CLEARPRINT

MULTIPLEXER CKT. FOR 40 TRACK

9-25-77



*REMOVED WHEN DRIVEN FROM 200KHZ SOURCE.

4.6 THEORY OF OPERATION

4.6.1 GENERAL

4.6.1.1

The theory of operation is presented primarily as an aid to the analysis of any malfunction which might occur. The overall control system is rather complex, and it would be impossible to list all possible faults and their symptoms. However, a thorough understanding of how the system works will help in pinpointing a problem and in establishing its correction.

This section is sub-divided into three parts, covering:

(1) the tape motion control system
(2) the multiplex system for presetting the record and monitor conditions
(3) the recording and reproducing audio electronics

4.6.1.2

To attempt to trace a signal through the system by means of the individual schematics and wiring diagrams is complicated and time consuming. For this reason, several "system" type schematics have been included in the manual to simplify that process. While these system schematics duplicate the information in the other diagrams, they combine it in such a way that they are useful also for trouble-shooting. However, during actual maintenance or repairs of the equipment, the individual schematics and parts lists should also be consulted to assure your having completely up-to-date parts information.

When using the system schematics (particularly the tape control system), several things should be kept in mind. First ~~off all~~, where diodes are shown without type numbers, they are all type 1N100 germanium diodes. These diodes are characterized by a lower forward voltage drop (approx. 0.3 volts) than for silicon diodes. (Incidentally, the maximum temperature that germanium devices can tolerate is substantially lower than for silicon devices, and they must be treated accordingly.) The second thing to remember is that the undesignated transistors are 2N3702 or 2N3704, depending on whether they are PNP or NPN respectively. Third, the TIP121 and TIP127 transistors used in several places are Darlington-connected power transistors, with a Beta of the order of 1000. Since each one is actually two transistors in series, the forward base-to-emitter voltage drop is about twice that of conventional transistors.

4.6.2 TAPE MOTION CONTROL SYSTEM

The tape motion control system may be visualized in two parts:

(1) the servo system with its speed control for governing the tape motion at recording and reproducing tape speeds of 15 IPS, 30 IPS, and 60 IPS
(2) the logic system which inhibits the speed control and substitutes its own signals to the motors for all other

tape modes

2

With only minor exceptions, these are separate unrelated functions, and can be treated separately here.

An examination of the Tape Control System Schematic, Figure 6-1, shows a "phantom" line separating the upper and lower halves of the diagram. The circuitry below the phantom line is essentially logic type ("on" or "off") circuits, used to determine the mode of tape motion, to start, stop and reverse the tape, and to automatically control the associated switching in the bias oscillator, preamps, line amps and power supply.

These two main functions are relatively independent of each other, as explained later, and the phantom line will help the reader to visualize them separately.

4.6.2.1 SERVO SYSTEM

In this description, we shall first examine the servo system, including the all important phase-lock feature, operating as it would in "play" mode. Figure 4-X is a block diagram of the entire servo system except for the "variable" speed mode.

Tape speed is sensed through the idler located in front of the head stack, around which the tape passes. The idler rotates on bearings having extremely low friction, and tape slippage on the idler is so low as to be virtually unmeasurable. Attached to the idler and rotating with it is a disc having alternate opaque and transparent lines precisely positioned around the disc (as spokes in a wheel). As the idler rotates, these lines "chop" the light traveling from a light source to a photo-transistor, resulting in a series of electrical pulses whose repitition rate (frequency) depends directly on tape speed. (Infra-red light sources and infra-red sensitive photo-transistors are used to avoid interference from outside sources.) There are 480 pulses per second at 15 IPS, or 32 pulses per inch of tape travel.

This transducer, together with pulse-shaping circuits, a frequency doubler and subsequent frequency dividers, constitute the IPS-to-frequency converter in the block diagram. The output frequency at correct tape speeds is always 60 Hz. For comparison with the tape speed pulses, there is a separate oscillator, as shown in the block diagram, crystal controlled for an accurate and very constant 60 Hz signal.

The 60 Hz signals from these two sources are then compared in the phase comparator, whose D.C. output depends on the phase relationship between the two signals. This D.C. voltage is applied to one input of a differential amplifier.

Simultaneously, the doubled frequency (960, 1920, or 3840 Hz, depending on assigned tape speed) is also fed to another converter (frequency-to-voltage converter in the block diagram) whose D.C. output voltage depends on tape speed. This output is fed to the other input of the differential amplifier. The D.C. output of the differential amplifier depends on the difference between these voltages, and is fed to the servo amplifiers driving the two reel

motors.

Observe, in the block diagram, the inverting amplifier ahead of one of the servo amplifiers. This is provided so that as the voltage on one motor is increased to speed it up, the voltage to the other (opposing) motor is reduced, in order to aid the "speed-up" process and to keep tape tension down where it belongs.

This speed control process is described in detail in the following paragraphs. An overall control system schematic, Figure 6-1, located in Section 6.0: DIAGRAMS, should be referred to while following this detailed analysis.

4.6.2.2 IPS/FREQUENCY CONVERTER

In the upper left corner of the schematic (box marked "SENSOR AND PULSE GENERATOR") are shown the LED infra-red light source D1102 and D1103 and the associated infra-red sensitive photo-transistors Q1102 and Q1103. As described above, the rotating disc interrupts and restores the light directed at the photo-transistors, which are precisely positioned so that they are simultaneously excited. (They are also placed across the disc from each other to minimize the effect of any eccentricity of the disc.) The "chopped" light turns the photo-transistors Q1102 and Q1103 on and off, thus intermittently grounding the emitter of Q1104. The resulting approximately-square wave signal on Q1104's collector is further amplified and "squared" by Q1105 acting as a switch".

The third "chopped light" switch (D1101 and Q1101) and associated circuits are described later in paragraph 4.6.2.9: DIRECTION SENSE CIRCUIT.

The next part of this circuit, comprising Q1106, Q1107, and Q1108, is somewhat unconventional. If the disc is not turning, Q1105 will be "on" or "off", depending on where the disc stopped. In either case, capacitors C1102 and C1103 will be charged to their applied voltages, no D.C. current will flow, and Q1106 and Q1108 will be off (non-conducting). With no voltage across R1108, Q1110 is also off, and the voltage at TP1105 is zero (ground potential). The significance of this is explained later.

With the disc turning, charging current will be applied to the capacitors, in first one direction and then the other. Assume for the moment that the disc was stopped in a position to leave Q1105 cut off. The left side of C1102 will be at -18V., and the right side will be at about -3.9V. (The latter is as far negative as it could go while C1102 was charging, consisting of the forward diode voltage of Q1106 base-to-emitter plus the emitter voltage of -3.2V.) Now, when the disc starts turning, Q1105 suddenly turns "on", clamping the junction of R1106 and R1107 at -3.2V. charging current immediately flows thru R1107, C1102 and C1103. Most (99%) of the initial voltage change will take place across C1103 until, in a matter of microseconds, the voltage at the right side of C1102 will arrive at about -1.8V. (-3.2V. + the two .7 volt drops across the Q1107 and Q1108 base-to-emitter forward diode voltages). At this point, C1103 can charge no further, and only C1102 is now charging thru R1107. As the disc continues to turn, the switch Q1105 suddenly opens, -18 volts is applied thru R1106 and R1107, and the foregoing

process reverses; C1103 re-charges to the -3.9 volt level where it is clamped by Q1106 base-to-emitter again, etc.

During the time that C1103 is charging in either direction (several microseconds), Q1106 and Q1108 are biased "off", as described earlier for the motionless disc. However, during the rest of the time, either Q1106 or Q1108 is conducting, turning Q1110 on thru R1109 and clamping TP1105 at -18V. Thus, during the short C1103 charging time, TP1105 is unclamped and allowed to swing positively to 0 volts, thus forming a positive-going pulse from a -18 volt base line.

Since this phenomenon occurs when Q1105 is clamped and again when it is unclamped, the pulse frequency at TP1105 is twice that of the square wave from the light chopper.

As Q1107 is turned on and off (at the light chopper frequency), the resulting square wave voltage across R1110 is differentiated thru C1104 and R1111 and applied to the base of Q1109. The result is a series of positive-going pulses at chopper frequency, applied to IC1101. The rest of that circuit will be described as part of the logic circuit for stopping tape motion.

The doubled frequency pulses (TP1105) are applied to IC701 (shown in the next box, marked "COUNTER"), which is a frequency divider. Only three of the outputs of IC701 are used: divided by 16, divided by 32, and divided by 64. In operation, only one or two of these are used at a time; the other two (or one) will be inhibited by the "SCAN" and "30 IPS" switches (shown below the COUNTER box in the middle of the schematic), as described below.

When both "SCAN" and "30 IPS" switches are off, the divide by 32 and divide by 64 outputs are both inhibited by grounding the output capacitors C703 and C704, and only the divide by 16 goes through. This is a square wave from IC701 at one-sixteenth the input pulse frequency, or 60 Hz for 15 IPS. The positive voltage excursion is differentiated thru C705, R708, and R717 (in the PHASE COMPARATOR box). The negative excursion is differentiated thru C705, R708, and the base-to-emitter current in Q703, turning Q703 on briefly. Note that only the negative-going pulses are effective, the positive pulses serving only to bias Q703 farther "off".

When the "30 IPS" switch is on, the divide by 32 output is enabled (no longer grounded), and both divide by 16, and divide by 32 goes through. When the "30 IPS" switch is off, and the "SCAN" switch is on, the divide by 64 is enabled and the divide by 16 is now inhibited. (Note that this last operation is accomplished by applying -24 volts thru R705 to the base of Q712, clamping divide by 16 to ground.) With divide by 32 inhibited, only divide by 64 goes thru. When both "SCAN" and "30 IPS" switches are on, only divide by 16 is inhibited, and both divide by 32 and divide by 64 goes through. Table 4-X shows the output combinations enabled for the four switch combinations.

Insert Table 4-X (Frequency Divider Outputs) here

When two counter outputs are enabled at the same time, it does not result in confusion at the phase comparator, for the following reason. At the moment when the divide by 32 voltage is swinging

either positive or negative the divide by 16 voltage is swinging negative. Thus, when the divide by 32 swings positive, it cancels the unwanted negative swing of the divide by 16 output, and no pulse results at the base of Q703. When the divide by 32 swings negative (where we want a pulse), the divide by 16 also swings negative, and actually enhances the negative pulse at the Q703 base. The same holds true with the divide by 64 and divide by 32 outputs where only the divide by 64 is desired.

4.6.2.3 PHASE COMPARATOR

The block directly below the COUNTER box on the schematic, entitled "60 HZ XTAL OSC", is shown in detail in its own schematic, Figure 6-X. It consists of a 3.579 megahertz crystal identical to those commonly used in color television receivers, and an IC which provides an oscillator circuit for the crystal and a frequency divider to "count down" from 3.579 MHz to 60 Hz. The output is essentially a square wave.

The oscillator output is fed thru R720 (box marked PHASE COMPARATOR) to the base of Q706, turning Q706 on and off at a 60 Hz rate. The resulting square wave is differentiated thru C712 and R712. The negative pulse thus formed is applied to the base of Q702, turning it on for about 350 microseconds, and then turning it off until the next pulse which occurs about 16 milliseconds later. When Q702 is "on", C711 is clamped to ground and discharged. During the Q702 "off" period, C711 is charging thru R710 to about -8.5 volts, more or less linearly, at which time the cycle repeats itself. The resulting 60 Hz voltage "ramp" is applied to the D701 cathode.

While all this is happening, the pulses from the frequency divider (COUNTER) are being applied, also at essentially 60 Hz, to Q703, as described above in paragraph 4.6.2.2. Each negative pulse turns Q703 on for about 150 microseconds, clamping its collector to ground. During this period, Q704 is turned on thru R716, clamping one end of R719 to -18 volts. Simultaneously, C709, which has accumulated a negative charge during the Q703 "off" period, drives R704 in a positive direction sufficiently to draw current thru D701. This, of course, limits the positive voltage excursion of the R704/D701 junction, and this is the voltage applied thru D702 to the base of emitter-follower Q705. (Since the time constant of R704 and C711 is many times as great as the duration of the pulse, no appreciable change in voltage across C711 takes place.)

The voltage across C713 is established by the emitter follower during the pulse "on" time. If the C713 voltage is more negative than that applied by Q705, it is immediately discharged appropriately to a less negative voltage by Q705. On the other hand, if the C713 voltage is too low, Q705 will not even conduct until the capacitor has charged thru R719 and Q704 to the point where Q705 again conducts and limits any further charge. During the "off" period between pulses, both Q704 and Q705 are turned off, and the only discharge path for C713 is thru R2005 and R2004, which is negligible.

It can be seen from the foregoing description that Q703, Q704, and Q705 "sample" the instantaneous voltage across C711 at a time determined by the instantaneous position of the tape, and then "hold" that sample until time to sample it again. This constitutes a classical repetitive "sample-and-hold" application.

If successive pulses from the tape movement are later and later relative to the 60 Hz oscillator pulses, the sampled ramp voltages will be more and more negative, and it will be seen farther on in this description that the result is to bias the servo amplifiers in a direction to speed up the tape. Of course, the opposite is true if the tape motion is too fast.

The voltage divider comprising R2004 (VSO box) and the parallel combination of R729 and R730 (DIFFERENTIAL AMPLIFIER box) reduces the effect of the phase comparator to a small fraction of that of the primary speed control to be described below. In this way, the phase-lock control acts as a sort of "vernier" control over the basic speed control, as is explained in more detail later.

4.6.2.4 FREQUENCY-TO-VOLTAGE CONVERTER

The pulses from the tape speed sensor are also fed to the frequency-to-voltage converter (box directly below PHASE COMPARATOR on schematic) thru R703 anc C715. (During servo operation, -24 volts is applied thru R821 to D703, effectively disconnecting the diode.) These positive-going pulses turn on Q708 very briefly (a few microseconds), long enough to discharge C719. During the "off" period between pulses, C719 is being charged in a positive direction (toward ground potential) thru whichever speed pot and associated resistor has been selected by the "SCAN" and "30 IPS" switches. For example, with the switches "off" as shown on the schematic, 15 IPS is the selected speed, and C719 charges thru R401 and R404. The voltage to which C719 will charge depends (for a given total "speed pot" resistance, R404 plus variable R401) on the inter-pulse period, and will therefore decrease as the speed increases. Thus, the average voltage across C719 is inversely proportional to tape speed (approx.). The output waveform is a series of "sawtooth" voltage ramps, and therefore consists of a D.C. component and many A.C. harmonics of the pulse frequency. The two stage filter (LOW-PASS FILTER box) which follows the converter effectively eliminates the A.C. components of the signal, and pass only the D.C. voltage level.

A comprehensive analysis of the operation of this active low-pass filter is beyond the scope of this writing, and the interested reader is referred to the many published textbooks on the subject. It is sufficient for our purposes here to consider that the filter output is an essentially pure D.C. output proportional to the average of the sawtooth voltage applied at the filter input.

4.6.2.4 DIFFERENTIAL AMPLIFIER

The main characteristic of a differential amplifier is its response to the voltage difference applied to its two inputs. In the application described here (see DIFFERENTIAL AMPLIFIER box), the two inputs comes from the low-pass filter and from the phase comparator thru the VSO, respectively. The latter voltage, applied to Q710, is determined mainly by the voltage divider R729/R730, and is modulated only slightly by the phase comparator; the basic voltage is approximately -13 volts. This holds the emitters of Q710 and Q711 at about -13.5 volts, so that the base of Q711 must be very close to -13 volts in order for Q711 to "capture" its share of the current and become and amplifier. Thus, the tape speed must be such that the frequency-to-voltage converter and low-pass filter produce -13 volts. Too low a voltage will speed up the tape motion and, conversely, too high a voltage will reverse the torque and slow down the tape motion, as will be seen presently. In practice, the speed pot is adjusted so that, as the tape approaches the proper speed, the low-pass filter output will arrive at the proper voltage and allow the phase comparator to assume control.

Referring once more to the phase comparator, in the 1/60 second period between pulses, the capacitor C711 will charge from 0 volts to a little over -8 volts, and this represents the total voltage range out of the phase comparator for controlling the tape speed. After being applied thru the voltage divider formed by R2004 and the paralleled R729 and R730, the maximum voltage change available at the base of Q710 is little more than .2 volts, which corresponds to a tape speed change of about 14.75 to 15.25 IPS, when set for 15

IPS. Thus, the phase comparator provides a vernier control of tape speed.

The differential amplifier output is taken from the collector of Q711, which is connected to the bases of the servo amplifier transistors Q802 and Q807. The current thru the Q711 collector will increase if the low-pass filter output voltage goes less negative (tape speed decreases), or if the phaae comparator output voltage goes more negative (tape phase pulse is late relative to the xtal osc. pulse).

4.6.2.6 SERVO AMPLIFIERS

Transistors Q802 and Q302 constitute the "servo" (or driver) amplifier for the take-up reel motor. Similarly, Q808 and Q301 constitute the supply reel motor servo amplifier, in this case preceded by an inverting amplifier (Q807) designed to provide some negative feedback.

To understand the operation of the servo amplifiers, look first at the take-up reel motor amplifier, Q802/Q302. The motor has approx. -19 volts applied to one terminal, while the other terminal goes thru Q302 and R303 to ground. Q302 acts as an "emitter follower", so that it applies to the motor winding whatever voltage is on its base. As long as Q802 is biased "off", R808 holds Q302's base at emitter potential, Q302 is "off", and no current flows thru the motor. However, as the base of Q802 goes negative by about 1.5 volts (Q802 is a Darlington-pair, and has a double diode forward voltage drop) and biases Q802 "on", the collector of Q802 swings positive (less negative), swinging the base of Q302 positive with it. The Q302 emitter "follows" its base in a positive direction, applying a voltage drop across the motor which starts the tape moving. The amount of voltage so applied (and therefore torque) is proportional to the Q802 base current, supplied by the differential amplifier output.

Observe R809 connected between the Q802 base and the tape lifterrsolenoid B303. During servo operation, the tape lifter is not energized and, since its coil has only a few ohms resistaace, R809 is virtually grounded. This being true, the first 3/4 milliampere of current from the differential amplifier is used to produce the fraction of a volt across R809 to forward-bias Q802, and all further increase in base current is amplified to produce torque, as explained above.

The operation of the supply motor servo amplifier is essentially the same; however, it is not driven directly from the differential amplifier, but by the inverting amplifier instead. This will be explained later.

With the tape at rest or moving very slowly (such as right after PLAY is started), the filter output voltage is only slightly negative, applying that low voltage to the base of Q711 thru R728. This forward-biases Q711 strongly, and effectivey clamps its emitter to the base of Q802. The combined forward diode drops across D302 and Q802 will permit the base of Q802 to go only about 3 volts negative, so the rest of the voltage drop (about 15 volts) appears across R731 in the differential amplifier. This same -15 volts is on

the emiiter of Q710, biasing it "off", and the phase comparator is momentarily out of the circuit. The Q802 base current turns Q802 on, and essentially full voltage is applied to the take-up motor.

If the tape "overshoots" its required speed, the filter output goes to more than the desired -13 volts. With Q710's base held at -13 volts, the emitters of Q710 and Q711 are held at about -13.5 volts, Q711 is now biased "off", Q802 loses its source of base current, and torque is applied to the supply motor to slow down the tape, as described next.

It was explained earlier that the exciting current for the takeup servo amplifier (at the base of Q802) came from the differential amplifier. The corresponding exciting current for the supply reel servo amplifier, applied to the base of Q808, comes thru R818 and R819 from Q810 (below the phantom line). During play and record modes of operation, Q810 is clamped "on", and its collector is held at -24 volts. The resulting current would turn on the supply servo amplifier and apply full reverse torque, if it were not inhibited by Q807.

The transistor Q807 constitures a sort of differential amplifier by itself, the two inputs being its base and its emitter, respectively. A negative voltage increase on its base would increase its collector current, while a negative voltage increase on its emitter would decrease the collector current. As the Q807 collector current is increased, its voltage swings positive (less negative), so that less voltage is applied to R818, resulting in less base current at Q808 and therefore less reverse torque.

The differential amplifier output which is connected to the base of Q802 is also connected to the base of Q807. Thus, a negative voltage increase resulting in a takeup motor speed-up would simultaneously result in a decrease in reverse torue at the supply reel motor.

Observe that the emitter of Q301 is connected thru a voltage divider R816/R814 to the emitter of Q807. As Q301 draws more current thru B301 (supply motor), the emitter swings in a positive direction, driving the emitter of Q807 positive and reducing the drive to the servo amplifier. This constitutes negative feedback, and, in effect (during normal play mode operation), the voltage applied to B301 is proportional to the voltage excursion of the base of Q807.

The reel drive motors are brush-and-commutator type motors with permanent magnet fields. A significant characteristic of such a motor is its action as a generator When the shaft of a permanent magnet motor turns, the motor generates a D.C. voltage proportional to its speed, of the same polarity as the voltage applied to the motor to drive it in that direction. (This generated voltage is called back emf.) Because of this, the motor draws less current, for a given applied voltage, as it picks up speed. Conversely, if the motor shaft is forced to turn in the opposite direction, the back emf is of the opposite polarity and the current increases; so does the torque.

As the takeup reel fills up with tape and the radius of the tape pack increases, it takes more motor current to pull the tape through. Part of this current increase results from the reduced motor speed, and the rest of the increase requires more takeup servo

amplifier drive. At the same time, the supply reel is unloading, and reducing its tape pack radius, speeding up that motor and increasing its back emf. In order to maintain uniform tape tension and motion throughout a reel of tape, the relationships between servo amplifier gains, thresholds and other characteristics are quite complicated, and far beyond the scope of this writing. It is sufficient to say that any indiscriminate changing of the values or tolerances of resistors or other components of the servo system can only result in degrading its performance.

The network consisting of R701, C701, C725, D704 and D705 constitutes a negative feedback lead-network to slow down the high frequency response of the servo system and stabilize its operation.

When the play function is not in operation, Q810 is off, and ground potential is applied thru R826, R821 and D703 to the base of Q708 in the freq.-to-voltage converter, saturating Q708 and holding its collector at -18 volts. This biases off Q711 in the differential amplifier turning of Q802 and Q807. The base of Q808 is no longer biased on (thru R818 and R819), and thus both servo amplifiers are turned off.

4.6.2.7 CONTROL LOGIC SYSTEM

The portion of the control system described below, the "logic" system, involves on-off function only (in contrast with the "analog" servo system described above), and serves to establish the necessary conditions for each operational mode. Referring again to Figure 6-1, the entire tape motion control logic system is shown schematically ~~below the phantom line (except for~~ the stop mode tape tension circuit at the top).

The various modes are initiated by the six switches shown at the left end of the diagram: STOP, PLAY, REC, LOAD, FWD, and REW. Each switch has associated with it a thyristor and a tally light. The thyristor acts electronically as a "latch" to hold the circuit engaged once the switch has been actuated and then released. For purposes of this description, the important characteristics of the thyristors used in the system are as follows:

(1) When the thyristor is "off", it will remain off as long as the "gate" electrode is held at cathode potential.
(2) With voltage applied in the correct polarity across the thyristor (anode to cathode), swinging the gate at least .8 volts positive with respect to the cathode for a few microseconds will "trigger" the thyristor into conduction, and it will remain in this state even though the gate swings back to cathode potential.
(3) Once conduction is initiated, it can be interrupted only by reducing the current thru the thyristor to zero, or at least below the holding current (usually a few milli-amperes). This can be done by forcing the voltage across the thyristor to zero or less, or by forcing the gate negative.
(4) In conduction, the forward voltage drop across the thyristor, at the currents encountered in this system, is about 1 volt.

With these things in mind, we can proceed to the switch circuits, all of which work essentially alike. Starting with the "STOP" switch, we see that the thyristor Q505 acts as a switch, in series with the lamp I503 as a load, between +1.2 volts and -24 volts. (The reason for the +1.2 volt common, rather than ground, will be explained later.) The gate of Q505 is held at cathode potential thru R501, and no current flows. If we now actuate the "STOP" switch, the +1.2 volts is applied thru R502 to the gate, turning Q505 on. The cathode swings to within about a volt of the anode, and the lamp has about 24.2 volts across it, drawing 40 milliamperes. This state is maintained when the switch is released. Note that the common circuit to all the rest of the switches goes thru the stop switch normally-closed contacts, so that voltage is removed from the other switches whenever "STOP" is actuated. This provides a double assurance of turning off whichever thyristor was previously turned on, as well as preventing any simultaneous operations.

Basically, all of the switches turn on their thyristors in the same manner. There are, however, some interlock circuits associated with them, which are explained later.

As noted earlier, once a thyristor is turned on, it remains on as long as it is carrying current, as if it were a diode. To turn it off, we must interrupt that current, which means reducing to zero, or reversing, the voltage across the thyristor momentarily. With one exception (explained later), this is done thru the commutating capacitors C501 thru C504. These are all connected to one line (LOAD), and a sharp positive voltage pulse applied to any one of them will be coupled thru all of them. Thus, whenever any thyristor is turned on (except RECORD), the sudden positive excursion of its cathode is coupled to the other cathodes. If one of the other thyristors is one, the positive D.C. charge on its capacitor plus the positive pulse will drive its cathode positive with respect to its anode, thus reverse-biasing it and reducing its current to zero, and turning it off; it takes less than a millisecond for this to happen.

The interlocks mentioned earlier are provided to prevent simultaneous operation of switching circuits, where such operation would result in malfunction. Note than when "FWD" is pressed, its normally closed contacts are open and prevent "REW" from actuating. The same thing is true in reverse. Thus, it is impossible to actuate "FWD" and "REW" simultaneously. Similarly, when "LOAD" is pressed, neither "FWD" now "REW" will go on. The "STOP" interlock was exrlained above. On the other hand, "LOAD" and "PLAY" can be actuated simulaneously, as there is no interlock between them.

A different type of interlock is used for the "REC" switch. When "PLAY" is not engaged, the anode of Q504 is at -24 volts, so that there is no voltage across Q504 with which to turn it on. When "PLAY" is engaged, the Q504 anode is at about +.2 volts and it is ready to be turned on. If the "PLAY" button is released, pressing the "REC" button cannot turn Q504 on since D501 is reverse biased and will not supply the necessary gate cuurent to Q504. However, if "PLAY" is held down, gate current is supplied thru R504, and now both Q504 and Q506 are on. Pressing any one of the other switches will, as explained earlier, turn off "PLAY" thru one or two of the commutating capacitors, and when "play" is off, "rec" goes off with it.

When both "play" and "rec" are on, C505 charges thru R507 to the voltage across I502, about 23 volts. If "PLAY" is then pressed, the negative end of C505 is swung in a positive direction thru R504, putting a positive pulse on the cathode of Q504, reducing the Q504 current to zero and turning it off. Or, alternatively, pressing "REC" puts a strong negative pulse on the Q504 gate, which will turn Q504 off as stated earlier.

Each switch circuit, when it goes on, swings its associated lamp voltage to about +.2 volts, and that same voltage swing is applied to the external circuit controlled by that switch. Some of the control circuits (load, forward, and rewind) involve inhibiting of transistors by forcing their bases to ground potential thru diodes. Since the sum of the thyristor and diode forward voltage drop is greater than the forward bias of a transistor, it is necessary to hold the thyristor anodes sufficiently positive to make sure the transistors will be "off" when inhibited, hence the +1.2 volt common. This voltage is obtained by connecting the motor power supply positive terminal to ground thru the double diode D303. The curent thru the power supply also passes thru D303, holding its anodes at about +1.2 volts.

4.6.2.8 PLAY CONTROL CIRCUITS

On the system schematic (Figure 6-1), refer to the area just below the phantom line in the right hand half of the diagram. The play control from the switch, labeled "PLAY", goes thru R823 and R824 to the base of Q810. Before "play" is activated, this line is at -24 volts, and Q810 is biased off. When "play" is activated, this line applies a forward bias to Q810, turning it on. The collector swings to within about .2 volts of -24 volts, with the following results.

(1) Thru D809, Q803 is prevented from being turned on by Q801 (to be explained later).
(2) The supply servo system has -24 volts applied to it thru R819.
(3) Diode D703 in the freq-to-voltage converter is reverse biased, allowing the converter to work as described later.
(4) Forward bias is removed from the base of Q809, turning off "PRE" (unless the "PRE" switch is on or "REC" is activated).
(5) Thru D310, -24 volts is applied to the winding of relay K301, enabling it to operate when the record switch is turned on (explained in detail later).

The tape is now moving under control of the servo system described earlier. The tape lifter drive transistor is off, and the tape lifter solenoid is de-energized. Although there is now a negative voltage on the "MOTION" line (as explained in the first part of paragraph 4.6.2.2), Q801 is inhibited by D803 and the very low resistance of the tape lifter solenoid to ground. Similarly, there is a negative voltage on the "DIR Q" line (explained below), but Q805 cannot get any current from Q806 which has no forward bias and is turned off. Thus, none of the servo amplifier inhibitor circuits below the phantom line are in effect.

4.6.2.9 DIRECTION SENSE CIRCUIT

To understand the derivation of the direction signals (e.g. "DIR Q"), it is necessary to refer to the SENSOR AND PULSE GENERATOR block of the diagram. The integrated circuit IC1101 is a digital dual "D" type flip-flop circuit, of which only one is in use here. It is characteristic of this device that when a positive-going pulse (trigger) is applied to the "clock" input (pin 11 of the IC), the "Q" output (pin 13) will assume the voltage state which was present at the "data" input (pin 9) when the pulse occurred, and will hold that state until the next pulse. The voltage state of the "Q" output (pin 12) is always opposite that of "Q".

The voltage on pin 9 is determined by the current thru Q1111, which in turn depends on the amount of light striking photo transistor Q1101. This last item, together with its light source D1101, is the third "chopped light" switch mentioned in paragraph 4.6.2.2: IPS/FREQUENCY CONVERTER. When light to Q1101 is interrupted, pin 9 swings negative (from ground potential). When light to Q1102 and Q1103 is interrupted, a pulse is applied to pin 11. Thus, for forward tape motion, we want Q1101 to be dark at the moment the pulse appears, so that the "Q" output will be negative. (The fact that pin 9 swings positive and then negative again between pulses does not alter the negative voltage on pin 13, as stated above.) To

accomplish this, the D1101/Q1101 light switch is very accurately located so that a line on the chopper disc will encounter it 1/4 cycle (of chopper frequency) ahead of the other light switches, for forward tape motion. This angular displacement amounts to less than 1/2 degree, with a tolerance in the order of 5/100 degree. This placement is done precisely and permanently in manufacture, and should never be tampered with.

When the disc is turned in the opposite direction (reverse tape motion), the pulse occurs when pin 9 is positive, and consequently pin 12 is negative.

4.6.2.10 STOP CONTROL CIRCUIT

Assuming the machine to be running in "PLAY" mode, let us now push the "STOP" button. The cathode of Q505 swings positive and is latched at about +.2 volts. The positive voltage on the "PLAY" line is abruptly removed, by commutation thru C503 and C504, and by interruption of the common return; the "PLAY" line swings to -24 volts. Q810 is turned off, and its collector swings positive to ground potential thru R826. Excitation voltage to the supply servo amplifier (thru R819) is removed. Current thru R821 and D703 in the Frequency-to-Voltage Converter saturates Q708, removing excitation voltage from the takeup servo amplifier.

The positive swing of the Q810 collector is coupled thru C802 and R806 to the base of Q803, pulling its collector to -24 volts. The inhibiting diode D803 is now reverse biased, allowing Q801 to be driven to saturation by the negative voltage from the "motion" line. (The source of this voltage is explained in the first three paragraphs of 4.6.2.2)

The negative voltage now sustained on the collector of Q803 does four more things:

(1) The tape lifter solenoid is energized, lifting the tape from the heads.
(2) The -24 volts is applied thru J301 pin 29 to the power supply, increasing the voltage on the motors to about -33 volts.
(3) Negative voltage is applied thru R811 to the base of Q806 saturating it and clamping the emitters of Q804 and Q805 virtually to ground. With a negative voltage on the "DIR Q" line, Q805 is now clamped "on", which holds the base of Q802 near ground and thus disables the takeup servo amplifier.
(4) The negative voltage is applied thru R809 and R810 to the two servo amplifiers. The supply servo amplifier (Q808) is turned on in full, while the takeup servo is inhibited as just described.

The high reverse torque on the supply reel rapidly slows down the tape motion to a stop, and would actually reverse the tape motion, except for one thing. As soon as the tape motion stops, the voltage on the "MOTION" line drops to zero (ground potential), removing excitation to Q801 and de-energizing the tape lifter circuit. This removes the voltage from R809 and R810, again disabling both servo amplifiers; the tape remains stopped. The removal of tape lifter

voltage allows the power supply to revert to the lower voltage of about -19 volts.

When the stop thyristor Q505 latched, it applied +.2 volts thru the "STOP" line and R105 to the base of Q104 (upper right hand corner of the diagram). As an emitter follower, Q104 applies ground potential thru R104 and diodes D304 and D305 to the reel motors. The resulting low and equal motor currents hold a light tension on the tape in the stopped mode.

In stopping from "REWIND" with the tape moving in the opposite direction, the action is identical in all respects but one; now it is the "DIR Q" line that has a negative voltage on it instead, clamping Q804 instead of Q805, and also it is the supply servo amplifier which is inhibited, and the takeup reel motor produces high torque to stop the tape motion.

4.6.2.11 LOAD CONTROL CIRCUIT

Pressing the "LOAD" button latches Q502 on, and commutates all other thyristors off. With +.2 volts now on the "LOAD" line, D802 inhibits the tape lifter circuit, so that "MOTION" line voltage produced when moving the tape will not initiate the stop sequence just described. Turning off Q505 removes the tape tension produced by Q104, and the tape is free to be moved by hand.

If the "PLAY" button is pushed, the load circuit will be commutated off, but if the "LOAD" button is held depressed while pushing the "PLAY" button, both circuits will be latched on simultaneously. The servo system will be turned on up to the servo amplifiers themselves; however, the positive voltage on the "LOAD" line is applied thru D806 and D807 to the two servo amplifiers, holding them off. The only difference observed when moving the tape in these two modes ("LOAD" only or "LOAD/PLAY") is that, in "LOAD" only mode, the preassigned monitor circuits are in effect; with "PLAY" also turned on, the preassignments are cancelled (unless the "PRE" switch is on).

With both "LOAD" and "PLAY" thyristors latched, pressing either button will not change anything, since there is no commutating voltage step available to turn anything off. Thus, when in "LOAD/PLAY" mode, it is only necessary to press "PLAY" and "RECORD" to go into record mode without starting the tape moving. On the other hand, pressing any other button will commutate both "LOAD" and "PLAY" off.

4.6.2.12 FORWARD AND REWIND CONTROL CIRCUITS

The "FWD" and "REW" circuits function essentially identically, the only difference being which servo amplifier is inhibited, as explained below. Hence, a description of the "FWD" mode leads to an understanding of the "REW" mode. Note that the two cannot be engaged simultaneously, as the two switches are mutually exclusive thru their normally-closed contacts.

When "FWD" is pressed, its thyristor Q503 is latched and any other switch circuit is commutated off. With +.2 volts now on the "FWD" line, three things happen:

(1) The supply servo amplifier is inhibited thru D808.
(2) Q806 is inhibited thru D805, disabling the "direction" circuits which would otherwise try to stop the tape motion.
(3) Q803 is turned on thru R807, energizing the tape lifter, raising the motor voltage to -33 volts, and turning on the takeup servo amplifier thru R809 (as described in 4.6.2.10 for "STOP"). The stopped-tape tension is not present since "STOP" is off, and the tape moves toward the takeup reel at full speed.

When "REWIND" is pressed instead, the only differences are that Q806 is inhibited by D801 instead of D805, Q803 is turned on thru R803 instead of R807, and D804 inhibits the takeup servo amplifier instead of D808 inhibiting the supply servo amplifier.

When "FORWARD" or "REWIND" is dropped out by pushing "STOP" or "PLAY", the tape lifter is held on by the "MOTION" line as long as the tape is still moving in the normal stop mode described above. Q806 is no longer inhibited, and the tape is brought to a complete stop. If "PLAY" was pressed, Q810 is inhibited thru D811 until the tape stops and the tape lifter is released, at which time D811 is "disconnected" and Q810 is allowed to function as described in 4.6.2.8 above.

4.6.2.13 RECORD CONTROL CIRCUIT

As was noted earlier, when the "PLAY" circuit is engaged, -24 volts is applied thru D310 to one end of the K301 relay coil. Up to now, all three relays have remained de-energized, as shown in the diagram. If "PLAY" is held depressed and "REC" is pushed, turning Q504 on, the other end of the K301 coil swings positive and the relay actuates. The K301 contact 8 opening removes -24 volts from S404, the sync switch, to prevent energizing of the sync bus during record mode. The closure of K301 contacts 9/10 energizes K302. It also, thru D307:

(1) Energizes the record bus in the line amplifiers (to be described later);
(2) Thru D401, turns on I404, the "SYNC" tally light;
(3) Thru D306, energizes the "PRE" bus (to be described later), which was released when "PLAY" went on.

K302 now actuates, with the following results:

(1) K303 is actuated, which will hold off the sync bus voltage until K302 releases.
(2) Applies, thru D308, a holding voltage to the record bus
(3) Completes, thru K301 contacts 6/7, the bias oscillator turn-on circuit.

Upon turning off the record mode, either by releasing "REC" while still in "PLAY" or by pressing another button, K301 immediately releases, opening the bias oscillator turn-on circuit, as well as removing voltage from the K302 coil. The bias output is not interrupted abruptly; rather, it "ramps down" over a period of a fraction of a second, to avoid the clicks and pops on the tape

commonly encountered when bias is suddenly interrupted.

The release of K302 is delayed briefly by C303, so that the record bus and sync bus are held in the recording status until the bias level has "ramped" down, after which time K302 and K303 release, and the record, sync and pre buses are restored to the non-recording status.

When the record mode is turned off by pressing "STOP" or fast shuttle in either direction, the tape lifter immediately lifts the tape, but does so slowly enough that the lifting action constitutes a form of "ramping" down the bias, even though it happens before the bias oscillator is completely off.

4.6.2.14 POWER SUPPLY CONTROL CIRCUITS

Refer to Figure 6-5, Schematic Diagram, Power Supply. The power supply contains two separate DC. power sources, each consisting of transformer, bridge rectifier and filter, and, when the autolocator is supplied, a separate commercial regulated power supply. Each is individually fused, and all of them are turned on by a single switch located on the tape transport.

The secondary voltage of T101 is approximately 40 volts RMS producing, thru the bridge rectifier D101 and filtered by C101, about 60 volts DC. This unregulated voltage is transmitted to the bias oscillator module, where it is regulated and distributed to the various parts of the audio system. This is further described in section 4.6.4.

The secondary voltage of T102 is approximately 27 volts RMS which, after being rectified by the bridge rectifier D102 and filtered by C102, produces about -38 volts DC. This unregulated voltage supplies the 24 volt regulator, and also the reel motor power when in fast shuttle and while stopping. From the T102 secondary center tap we get half-voltage, or about -19 volts DC, filtered by C103, which supplies reel motor power in play mode and when stopped.

The plug-in regulator card in the power supply serves to regulate the -24 volts used for the logic system, and also contains switching circuits and an overload current limiter circuit for the reel motors, as described below.

The -24 volt regulator consists basically of a voltage reference zener diode D206, an amplifier Q202, and transistors Q201 and Q101 connected as a Darlington pair to control the output current. With the card connector pin 1 (J101) at -38 volts, the collector of Q201 is at -38 volts, which is also applied thru R201 and R202 to the base of Q202. With Q201 and Q101 both acting as emitter followers, the emitter of Q101 would also be at -38 volts except for the Q202 circuit. The emitter of Q202 is effectively held at -24 volts by D206. The emmtter of Q101 is connected thru pin 10 and R203 to the base of Q202 and, as soon as this voltage rises to about -24.6 volts, Q202 draws base current. The Q202 collector now draws current thru R201 and swings positive to about -24.2 volts. This reduces the voltage on the base of Q201, and the final voltage on pin 10 is slightly over -25 volts.

It should be noted (and remembered) that the ground symbol in Figure 6-5 represents only a common circuit for that diagram, and is not actually at system ground potential. By referring once more to Figure 6-1, in the lower left hand corner, the positive terminal of the reel motor power supply is carried thru J301 pins 25/26 and D303 to system ground. Thus, the apparent ground shown in Figure 6-5 is actually about 1.2 volts positive with respect to system ground, since all of the reel motor current returns to the power supply thru D303. (The tally light current from all of the static group switches also goes thru D303.)

The case and chassis of the power supply unit are not grounded, but are completely isolated.

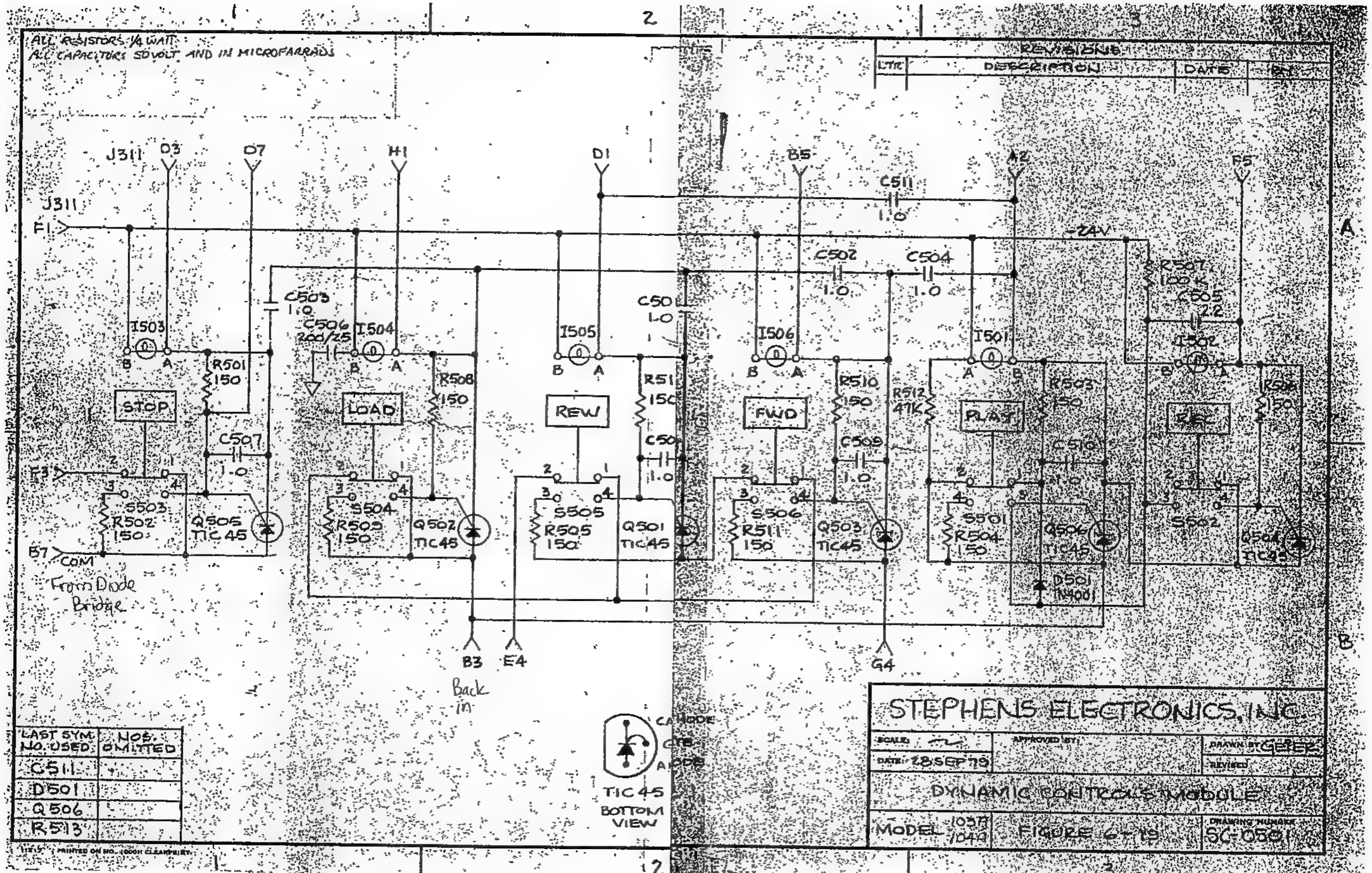
On pin 3, the voltage applied from the logic system depends on the status of the tape lifter circuit, as explained in 4.6.2.10: STOP CONTROL CIRCUIT. In play mode or with the tape at rest, pin 3 is at -1.2 volts (relative to power supply common), and with -19 volts on the emitter of Q204, it is biased off. This leaves Q203 and Q102 also "off", and current from the -38 source does not flow to the output. Instead, the collector of pass transistor Q103 is supplied with -19 volts thru D201. With the base of Q205 heavly forward-biased thru R206 from the -38 volt source, both Q205 and Q103 are saturated, and -19 volts is now fed, thru D201, Q103, R103 and M101, to the reel motors.

As more current is drawn from the power supply, thru the total resistance of R103, M101, and the two wires to J301 pins 21 and 22, the voltage drop across this total resistance increases, and the voltage at J101 pin 8 becomes more positive relative to the base of Q205. As soon as this voltage is high enough to exceed the forward drop across D202 thru D205, any further voltage increase (due to increased output0surrent) will force the base of Q205 in a positive direction, reducing the voltage on the base of Q103 and therefore the output voltage. This constitutes a current limiting function, and limits the output current to about 10 amperes. Note that the resistance of the wires is part of this critical total resistance, and must not be changed.

Returning to J101 pin 3, the voltage from the tape lifter circuit, when stopping or in fast shuttle mode, is -24 volts. This drives Q204 into saturation (thru R204 and R205), clamping its collector to -19 volts which, in turn, thru R207 drives Q203 and Q102 into saturation. This now connects -38 volts to the Q103 collector, disconnecting the collector from -11 volts by reverse biasing D201. The current limiting circuit still works as described above.

With the higher voltage applied to the reel motor, and with the associated servo amplifier full on, a considerable amount of current is drawn from the transformer/rectifier/filter combination where, due to its internal impedance, the source voltage drops to about 33 volts.

For the computer power supply (when used), the reader is referred to the power supply manufacturer's data.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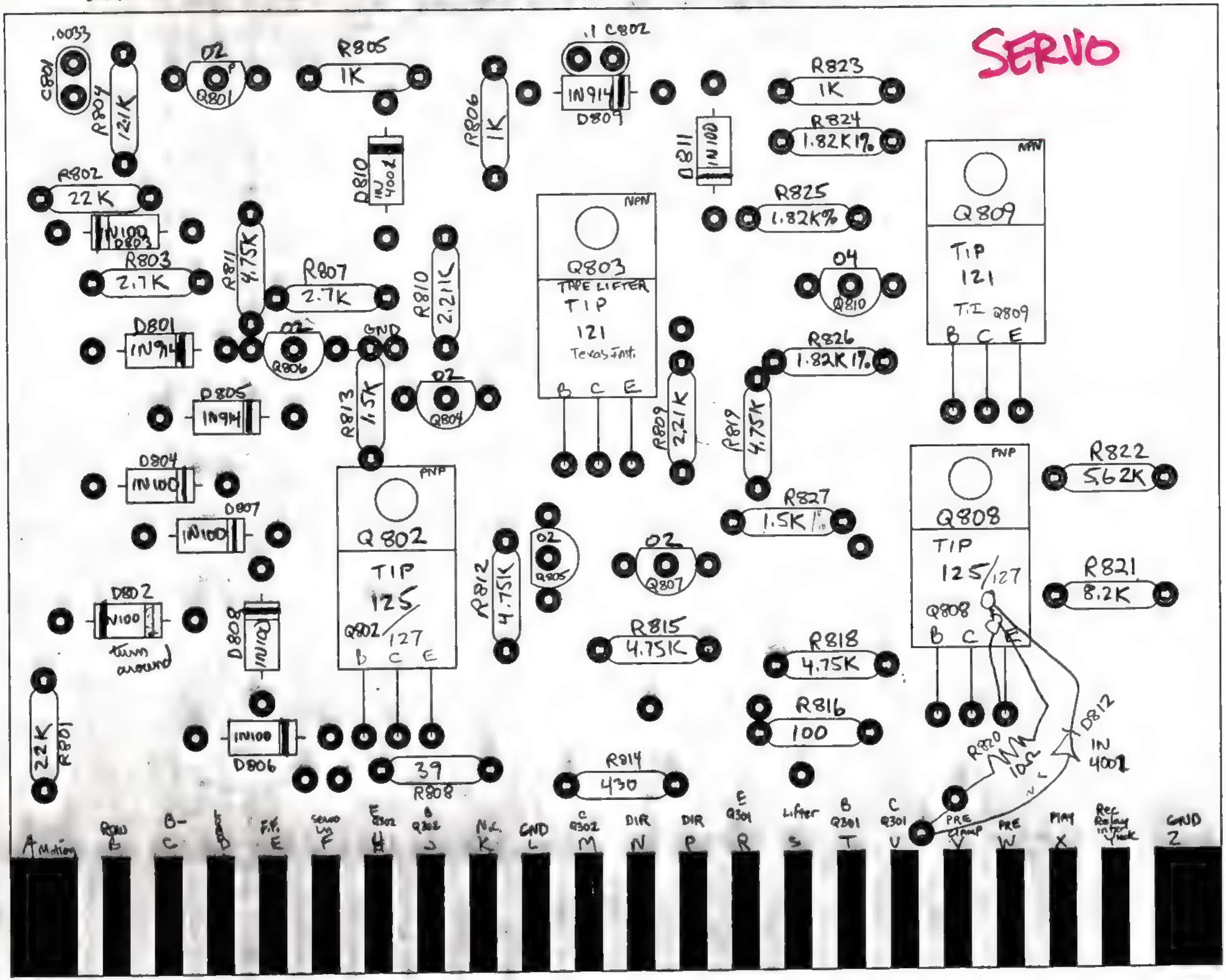
3702 - PNP
3704 - NPN

SERVO



CHECK OUT FOR STEPHENS 821-B

1. CUSTOMER: Studio purchasing recorder/reproducer.

2. ORDER NO: Same as job £, 3 digit £.

3. SYSTEM TYPE: Model No. eg.,821B-104A-24 QII.

4. POWER: 110/125 volts a.c. (unless otherwise specified).

5. FREQUENCY: 50/60 cycles.

6. SPEED: 15,30 and 60ips (unless otherwise specified).

7. TAPE WIDTH: 1/2", 1" or 2" (dependent upon the number of tracks).

8. NO. OF TRACKS: 2, 4, 8, 16, 24, etc.

9. HEAD TYPE: Manufacturer and model number.

10. SERIAL NO: Serial No. on the head.

11. BIAS FREQUENCY: Normally 204 KHz, fill in actual frequency checked on bias chassis output. (See £38).

12. BIAS VOLTAGE: Peak sign wave output from bias chassis output coil, normally 225 volts peak to peak (See £38).

13. WOW & FLUTTER: (WRMS filter, NAB standard) Record/playback measurements as checked on the sentinel flutter meter set on the .1% scale, NAB WTD. (5-200Hz) (see £56).

14. TAPE TENSION: Supply - Measured with tentelometer between the supply reel and the incoming guide assembly. Take-up - Measured between the outgoing guide assembly and the take-up reel. Both measurements taken mid-reel. (for 1" tape, deduct 20 grams from actual readings.)

15. MOTOR CURRENT: The measurement of the current draw as taken from the power supply mounted amp meter.

16. DYNAMIC CONTROLS: (Transport and remote) Check all shuttle modes. Do not put machine into record mode until the bias and record systems have been checked out!

17. 15, 30, SCAN: Check to see that all three speeds operate and are on speed. Adjust speed trimpots as necessary.

18. PHASE LOCK: Check to see that all three speeds are phase locked to the crystal time base. Note the phase lock on the VSO meter. The needle should be steady with the machine on speed. Adjust the speed trimpots for each speed to register 4 milliamps

19. VSO: Check to see that in VSO mode the red indicator lamp comes on next to the switch and that the speed is adjustable. Check the VSO meter calibration in BSO mode adjusted for slow sweeps, the needle should move full scale.

20. LAMPS & LEDS: Check to see that all lamps and LEDS function.

21. PRE: Check to see that PRE works by assigning channels to source. Input should be heard on tape recorder output whenever the PRE button is lit. PRE should be lit in all shuttle modes except play and should light in play mode when manually actuated. Check on deck and remote unit, if so equipped.

22. SYNC: Check to see that all sync relays are actuated when sync is depressed. The synclight should also light when sync is actuated.

23. SOURCE: Input should be heard on the tape recorder output of each channel when source is assigned with pre lit. Input should be visible on the VU meters with source assigned. Assign all channels to source. Apply a +15 dbm 1KHz signal to the tape recorder input, with pre not lit, measure the output on each channel, it should be -35 dbm minimum.

24. VU METERS: All meters should be checked for accuracy, that is, a 1KHz signal at +4db should equal "0" VU. Check all meters for sticking by spiking them with a +10dbm or better signal (enough to make them pin)adjust the bumper stops on any sticking meters.

25. Set up the record, low frequency E.Q. (15 &30 ips) and play level pots so that they are one turn from being fully clockwise.

26. Set up the high frequency record and play E.Q. pots and the bias level pots so that they are centered.

27. Power up the machine and note that each channel's VU meter deflects twice during the power up surge. If a VU meter does not deflect twice, it is an indication of a problem on that channel, correct before continuing.

28. PLAYBACK: Check for playback in the play and sync modes on all channels @ 15 & 30 ips by using the head demagnetizer as a signal in close proximity to the head stack. Use a VARI-AC (variable transformer) to reduce the signal level from the demagnetizer and to keep it from burning out. Depress load and play simultaneously to put the unit into the play mode without the reel motors actuated.

29. If all channels are working, clean and degauss (demagnetize) the heads.

30. Using the 30 ips alignment tape, align the audio playback circuitry for "0" VU (+4dbm) using the PLAY head for playback @ 1KHz and 10KHz. Use the Hewlett Packard Voltmeter on the test stand for measurements by monitoring each channel's individual playback output.

31. Check the playback level and high frequency e.q. pots full sweep, checking for dropouts. Replace any faulty pots. Check off sheet if all pots operate properly.

32 Calibrate the SYNC and PLAY head play back level at 1KHz using the alignment tape.

33. With the PLAY head aligned @ 1KHz and 10 KHz, check the 30 ips

reproduce - PLAY head.

34. Depress the SYNC switch and check the 30 ips reproduce, SYNC head

35. Repeat £30,31,33 and 34 using the 15 ips alignment tape.

36. check the playback phase of the play and sync heads at 12KHz.

37. RECORD: The first step on record is to check that the bias system is operational and is at the correct frequency and output voltage level. To check the bias chassis output connect the scope center probe to the bias chassis output coil white/black wire and the ground lead to the deck chassis ground. Depress load, play and record simultaneously and check for the bias signwave output on the scope, if no output appears, shut down from record immediately to keep from burning up the bias oscillator transistors. Check for a defective bias chassis, if sinewave is
attained,
check the peak to peak voltage (normally 225 volts). If the output voltage is correct, connect the frequency counter in parallel with the scope probe and measure the bias frequency (normally 204 Khz). If the bias chassis output and frequency are within specs, install the bias chassis back into the deck.

38. Connect the scope probe center lead to one of the bias output transistors yellow wires and the ground lead to chassis ground. Put the machine in the record mode and while watching the bias signwave on the scope, put one channel at a time into record. If the signwave should dissappear when assigning a channel, shut down from record immediately. Check the erase head on that channel for a shorted winding and if there is no problem with the erase head, check the pre-amp chassis record circuitry for a short circuit on that channel. Note any differences in signwave amplitude when assigning channels into record.

39. Check the record pre-set (latch) functions on each channel. Put the machine into record mode and check to see that the channel
x1 assign indicator for each channel actually trips the record and sync relays for that channel. Check to see that the recorded signal on each channel is evident on both the output and on the VU meter on the channel assigned to record.

40. Put 8 channels in record at a time and align the bias and record levels (bias is over bias 1/4 db @ 1KHz). Align the record level after biasing to register zero VU (+4dbm) at 1KHz and 10KHz. Check the bias and H.F. record pots for full sweep and replace and defective pots. Check the 1KHz and 10KHz record levels after this low frequency adjustment and adjust the playback level pot accordingly @ 1KHz. (the L.F. playback level pot will affect the 1KHz overall playback level).

41. Check the 15 ips record/reproduce alignment (1KHz & 10 KHz should be zero VU).Our specs are_+ 1db from 30 Hz - 16 KHz.

42. Change the speed selector switch to 30 ips and align the bias and record levels for 30 ips at 1 KHz and 10 KHz to zero VU (+4dbm). Set the 30 ips low frequency E.Q level pots at 100 Hz to read +1db with every other channel in record (1, 3, 5, etc.). Check the 1 KHz and 10 KHz record levels after this adjustment and adjust the playback level accordingly @ 1 KHz.

43. Check the 30 ips record/reproduce alignment (1 KHz & 10 KHz should be zero VU).Our specs are_+ 1db from 35 Hz - 25 Hz.

44. Check the rolling record punch in/punch out features on both the deck and the remote unit. You should be able to punch out into play from record by hitting either the record or play buttons. You should not be able to go into record by hitting the record button without holding down the play button at the same time. If all functions check, check off the record box on the check out sheet.

45. Check the record Phase @ 12 KHz @ zero VU. (instructions here).

46. On 4300 series Line Amp cards, check the mute circuit. Play a zero Vu (+4dbm) level off the tape (15 or 30 ips) and assign all channels to mute. When pressing the PRE button all outputs from the machine should be muted to -70 dbm. Check each channel for pops when assigning to mute with pre lit, and also when the channel is already assigned to mute check for pops when pressing PRE, actuating the mute circuit. On 4500 series Line Amp cards, check that the audio of each channel is muted in the rewind and fast foward modes.

47. Check the signal to noise ratio on each channel. (instructions here)

48. Check at what signal level a 3% THD is reached using Scotch 250 tape (unless otherwise specified) (instructions here)

49. Check the erasure depth as referenced to +10 dbm using Scotch 250 tape (unless otherwise specified). Record a + 10 dbm signal on tape @ 1KHz & 30 ips. Using the Philco frequency selective voltmeter, tune it to 1 KHz with a 100 Hz bandwidth. Fine tune it while recording the 1KHz tone. Rewind tape and play back approximately 10' of the 1KHz + 10 dbm signal. Switch the AFC switch on the Philco unit to "ON" Remove the signal source and put the machine into record. Measure the residual 1 KHz signal left on the tape. Put this -db number in the boxes on the check out sheet (e.g., after erasure a -55dbm signal is left on the tape, as referenced to a +10 dbm signal, that is a total of 65 db of erasure).

50. Check the square wave response @ 1 KHz. This is the record/reproduce square wave response as played back off the tape at "0" VU. Connect the scope to the machine output and check each channel. The square wave response should be virtually indentical in shape and amplitude on an aligned machine. A change in amplitude indicates record/reproduce levels are off, a change in shape usually indicates a faulty amplifier module in the record/reproduce chain. The output must be monitored during the playback of a recorded tape so that the bias signal is not visable. Put a check on each channel which passes this test.

51. <u>RECORD TRANSIENTS</u>: Record transients are "spikes" or "pops" audible either in the monitors or on the tape when going in and out of record mode. Use no input signal for this test.

"TAPE" - indicates a check for an audible monitor pop when punching in and out of record without any channels assigned to input and with the sync button out and not lit. Check tape playback for

any "ticks" or "pops" recorded on tape going in or out of record.

"PLAY/SOURCE" - indicates a check for an audible monitor pop when punching in and out of record with the sync button out of source pre-set.

52. "SYNC": Indicates a check for an audible monitor pop when punching in and out of record with no channels pre-assigned to source and the sync button depressed (lit).

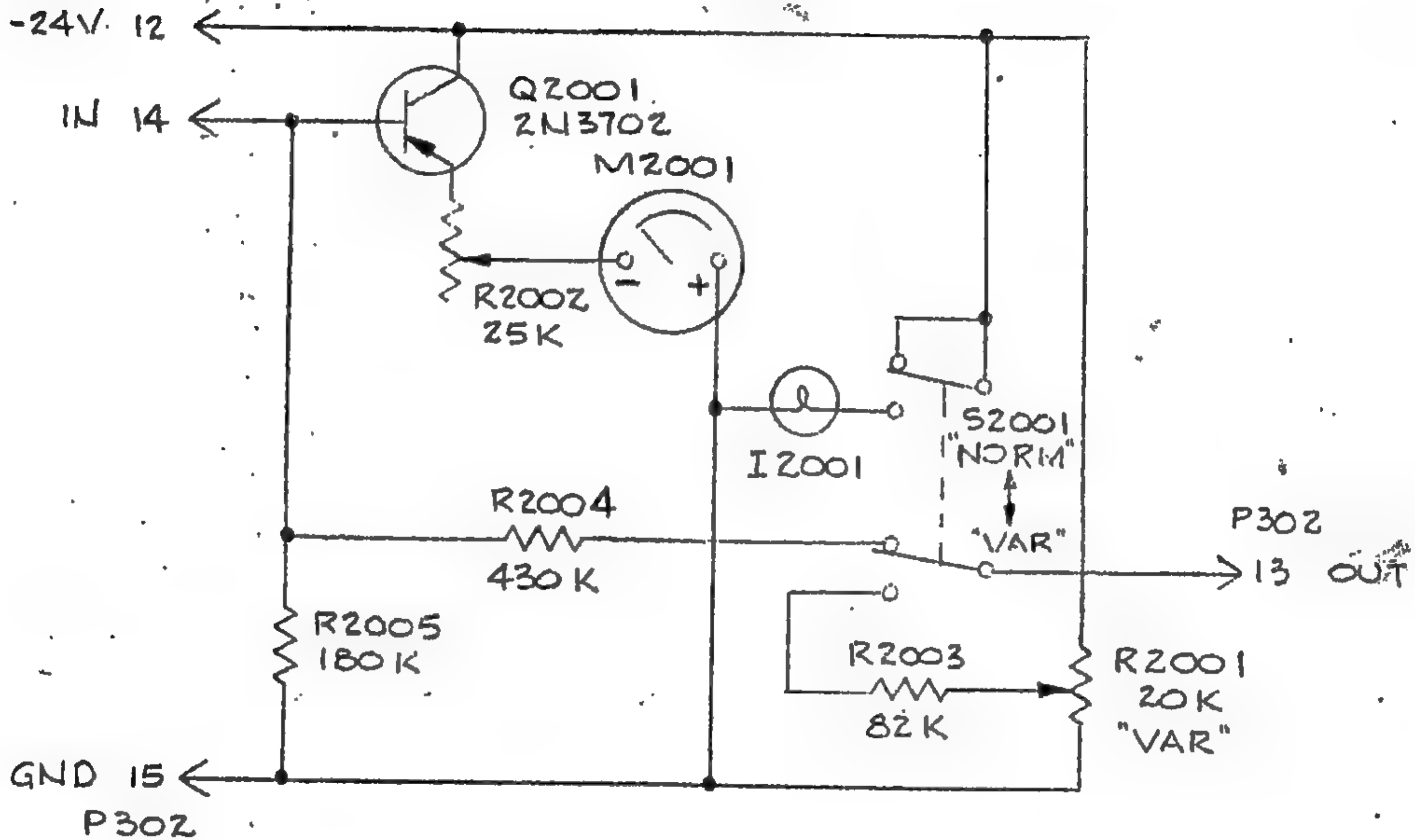
53. SYNC/SOURCE": Indicates a check for an audible monitor pop when punching in and out of record with the channels assigned to source and the sync button depressed (lit).

54. When testing is completed, the 30 ips playback alignment should be set for +3 VU @ 1KHz and 10 KHz. Bias and align 30 ips record to the type of tape specified by the purchaser of the machine (if none specified, use Scotch 250).

55. VERTICAL DRIVE: (Those machines so equipped) Check to see that the vertical drive functions. See "Vertical Drive" instructions.

56. WOW & FLUTTER: Using the Sentinel flutter meter, connect the 3 KHz osc. output of the flutter meter into the tape recorder input. Connect in 3 KHz in of the flutter meter to the output of the tape recorder. Put the tape recorder in the record mode on all channels. Monitoring the output of one of the center channels on the recorder, switch the flutter meter to the "set level" setting. Adjust the set level pot so that the flutter meter reads full scale deflection (1.0 or .3). Set the flutter meter to the .1% scale reading and the "NAB WTD 5-200Hz setting, allow a few seconds to stabilize and read off the % of flutter.

REVISIONS			
LTR	DESCRIPTION	DATE	BY



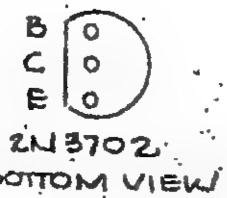
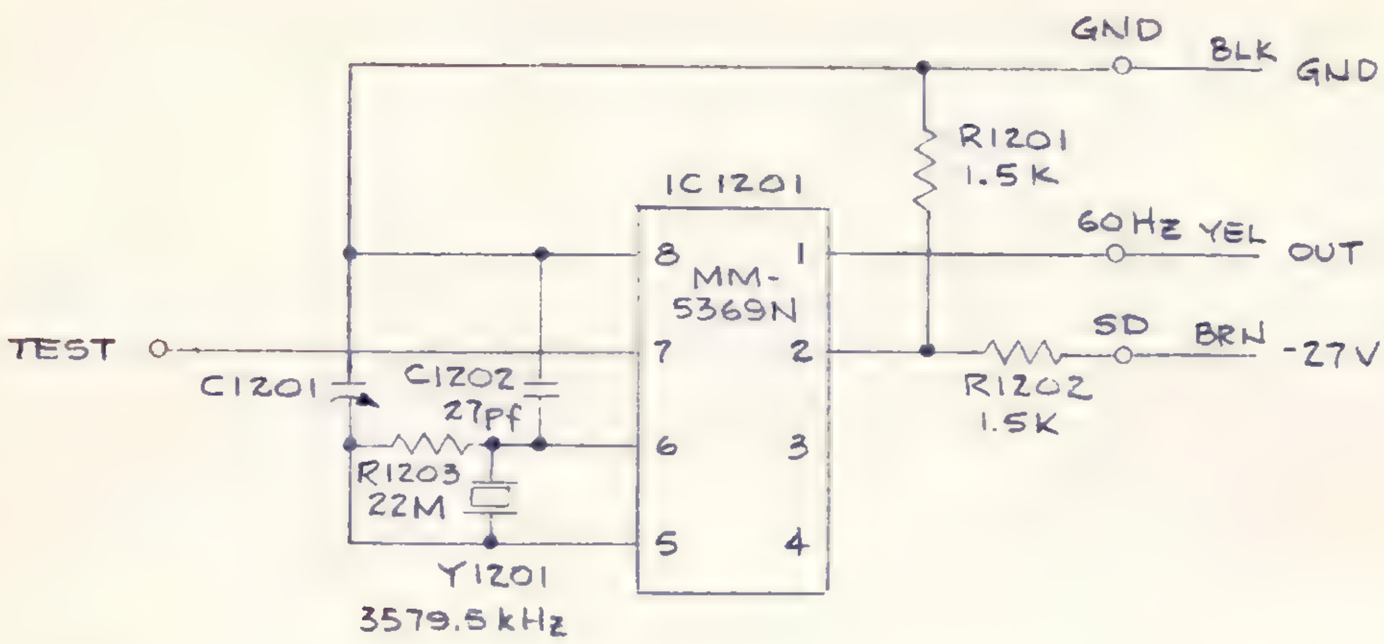


FIGURE 6-17

STEPHENS ELECTRONICS, INC.

SCALE: —	APPROVED BY:	DRAWN BY GEIER
DATE: 24 SEP 79		REVISED
VSO MODULE		
MODEL 821-B	FIGURE 6-17	DRAWING NUMBER SC-2001

REVISIONS			
LTR	DESCRIPTION	DATE	BY

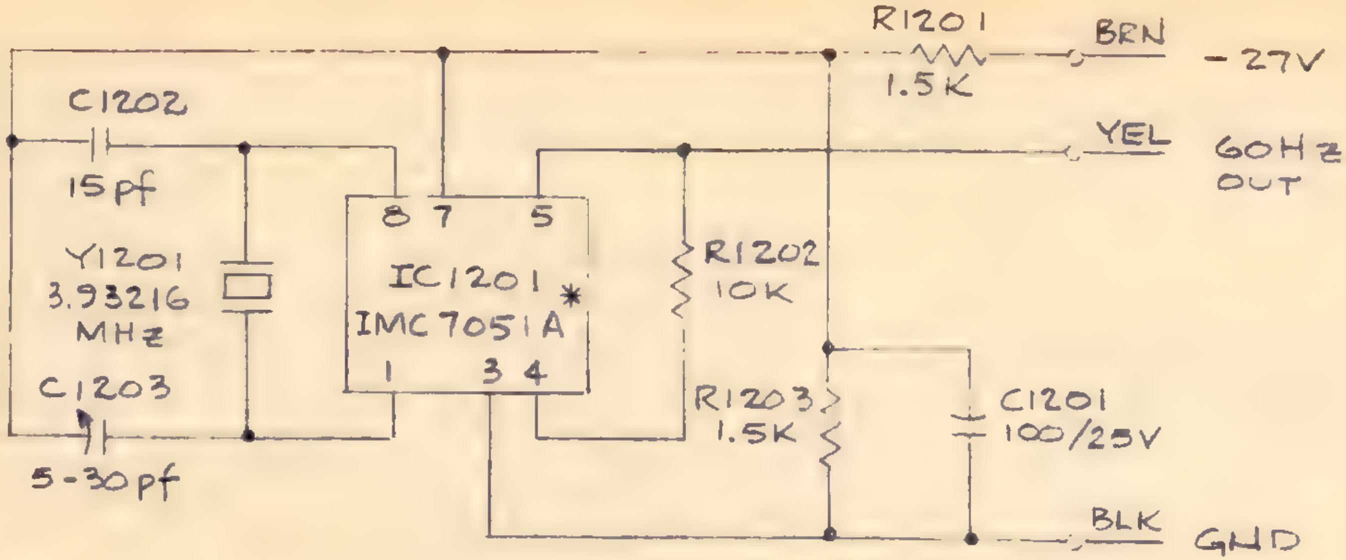


THIS SCHEMATIC APPLIES TO MACHINES UP TO AND INCLUDING SN 1064

FIGURE 6-13

STEPHENS ELECTRONICS, INC.		
SCALE: ~	APPROVED BY:	DRAWN BY GEIER
DATE: 19 SEP 79		REVISED
CRYSTAL FREQUENCY CONTROL CARD		
MODEL 821-B	FIGURE 6-13	DRAWING NUMBER REV. SC-1201

REVISIONS			
LTR	DESCRIPTION	DATE	BY



* ALTERNATE : ITS 9042-1

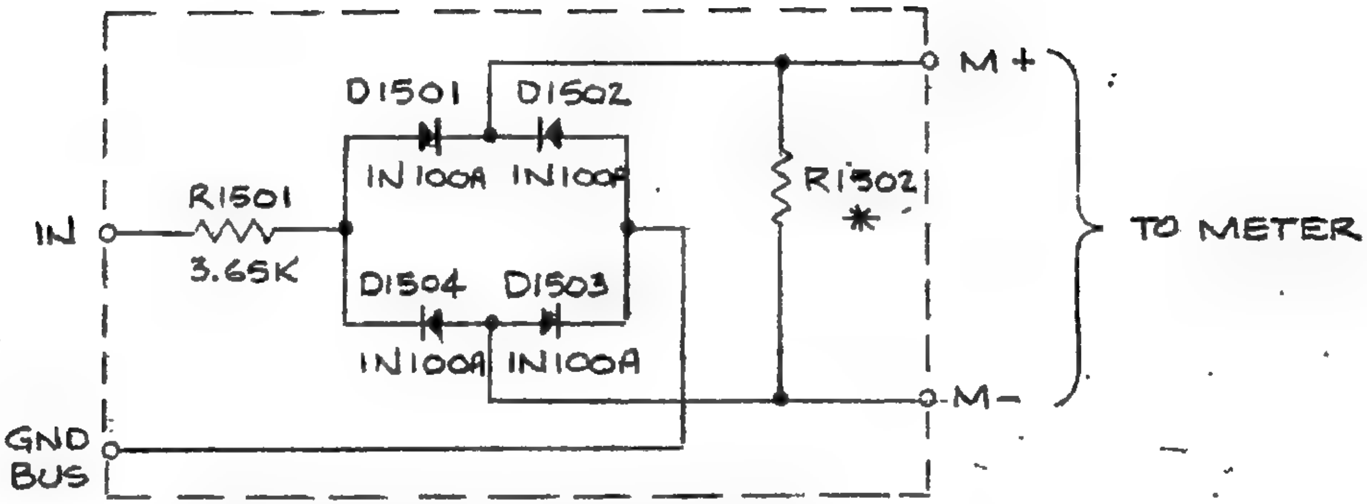
USED ON SN 1065 AND UP

FIGURE 6-13

STEPHENS ELECTRONICS, INC.		
SCALE: —	APPROVED BY:	DRAWN BY GEIER
DATE: 20 OCT 78		REVISED
CRYSTAL FREQUENCY CONTROL CARD		
MODEL 821-B	FIGURE 6-13	DRAWING NUMBER SC-1202

LTR	DESCRIPTION	DATE	BY

REVISIONS



* CALIBRATION RESISTOR, SELECTED AT FACTORY TO MATCH METER SENSITIVITY

FIGURE 6-16

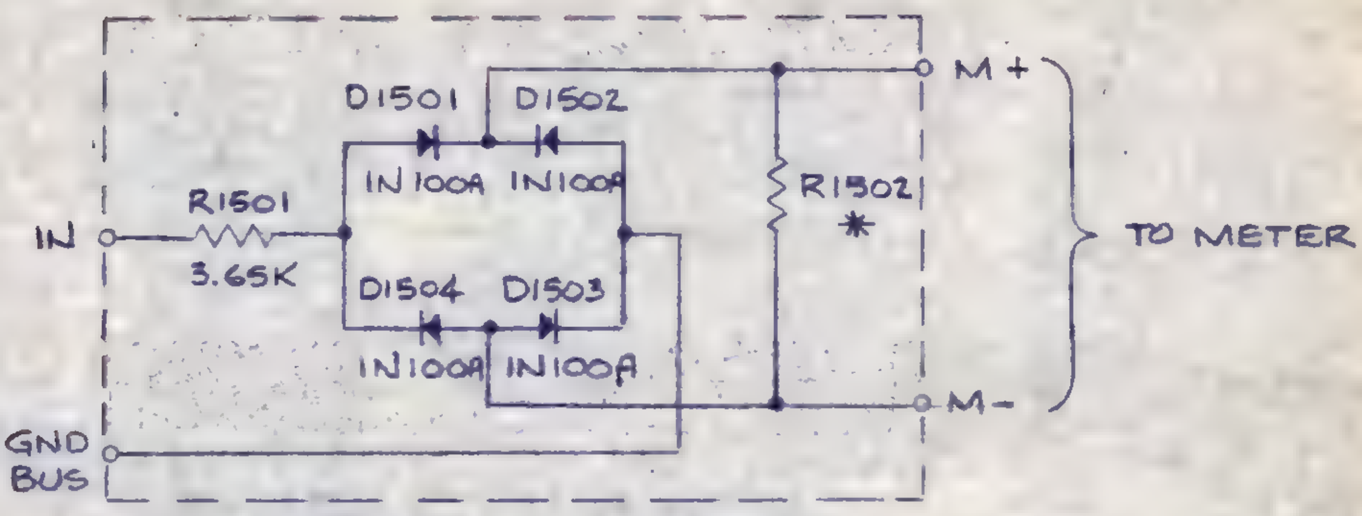
STEPHENS ELECTRONICS, INC.

SCALE: —	APPROVED BY:	DRAWN BY GETER
DATE: 24 SEP 79		REVISED

METER CALIBRATION CARD

MODEL 821-B	FIGURE 6-16	DRAWING NUMBER SC-1501

REVISIONS			
LTR	DESCRIPTION	DATE	BY



* CALIBRATION RESISTOR, SELECTED AT FACTORY TO MATCH METER SENSITIVITY

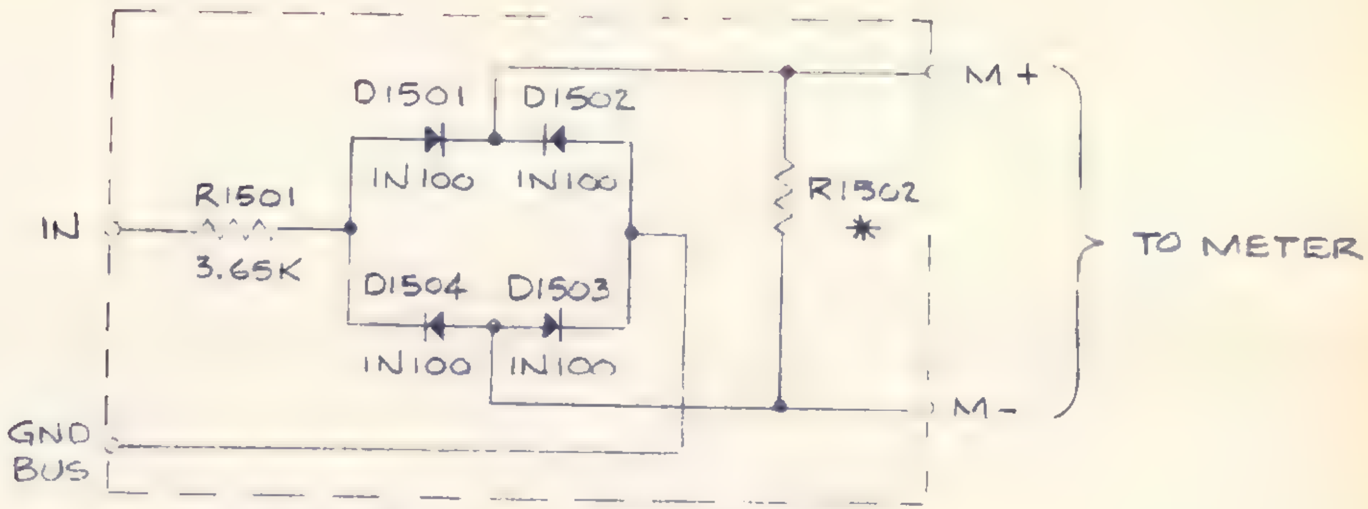
STEPHENS ELECTRONICS, INC.		
SCALE: —	APPROVED BY:	DRAWN BY GEPER
DATE: 24 SEP 79		REVISED
METER CALIBRATION CARD		
MODEL 821-B	FIGURE 6-16	DRAWING NUMBER SC-1501

FIGURE 6-16

8½X11 PRINTED ON NO. 1000H CLEARPRINT

REVISION

LTR	DESCRIPTION	DATE	BY



* CALIBRATION RESISTOR, SELECTED AT FACTORY TO MATCH METER SENSITIVITY

FIGURE 6-16

STEPHENS ELECTRONICS, INC.

SCALE: ~

DATE: 24 SEP 79

APPROVED BY:

DRAWN BY GEPE ?

REVISED

METER CALIBRATION CARD

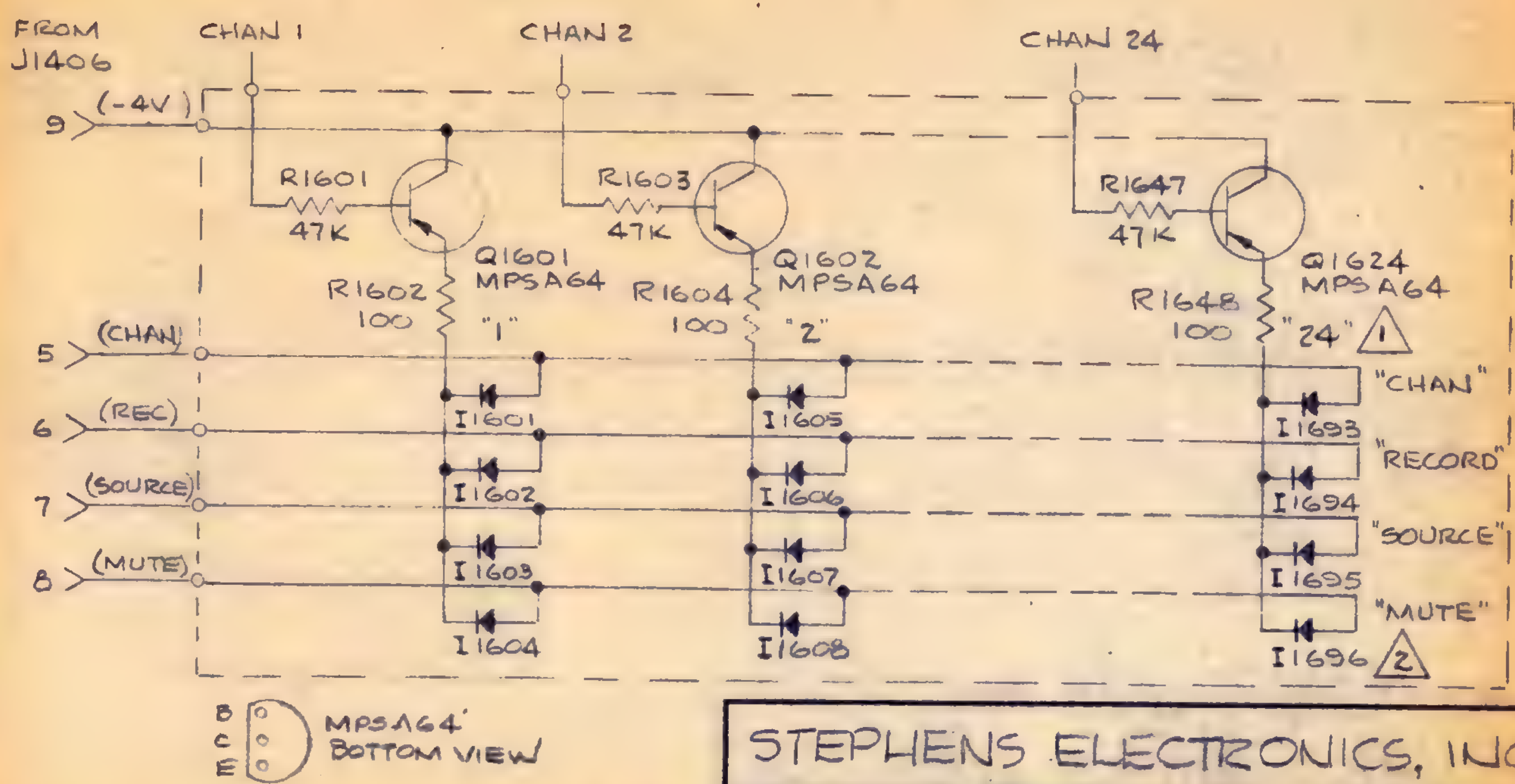
MODEL 821-B

FIGURE 6-16

DRAWING NUMBER SC-1501

8½X11 PRINTED ON NO. 1000H CLEARPRINT

REVISIONS			
LTR	DESCRIPTION	DATE	BY



2 LED CARD UNIT SERIES CONTINUES INTO 1700'S FOR 32 & 40 TRACK.

1 24 TRK VERSION SHOWN. LAST NO CORRESPONDS TO NO. OF TRACKS

STEPHENS ELECTRONICS, INC.

SCALE: —

APPROVED BY:

DRAWN BY GEIER

DATE: 22 OCT 79

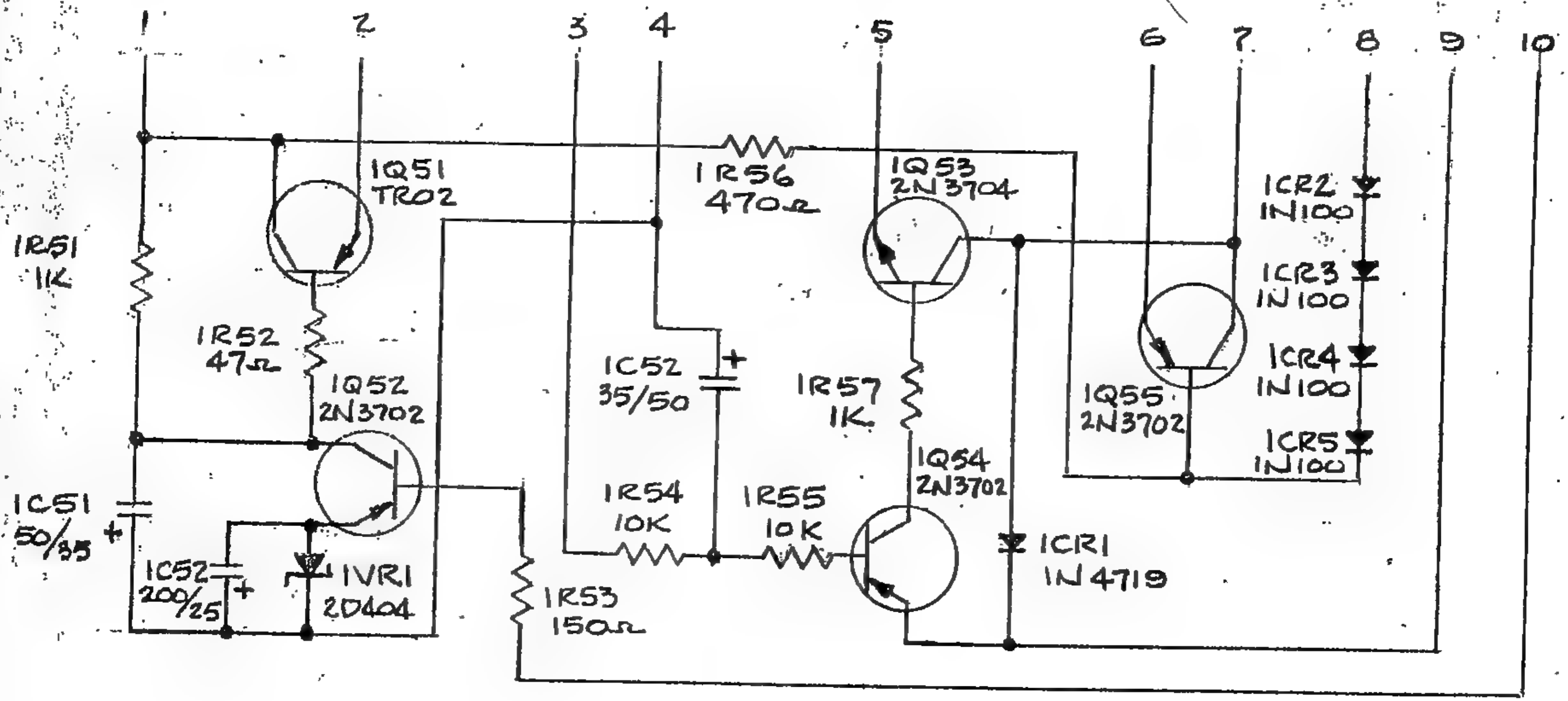
REVISED

LED CARD

MODEL 821-B

FIGURE 6-14

DRAWING NUMBER SC1601



STEPHENS ELECTRONICS, INC.

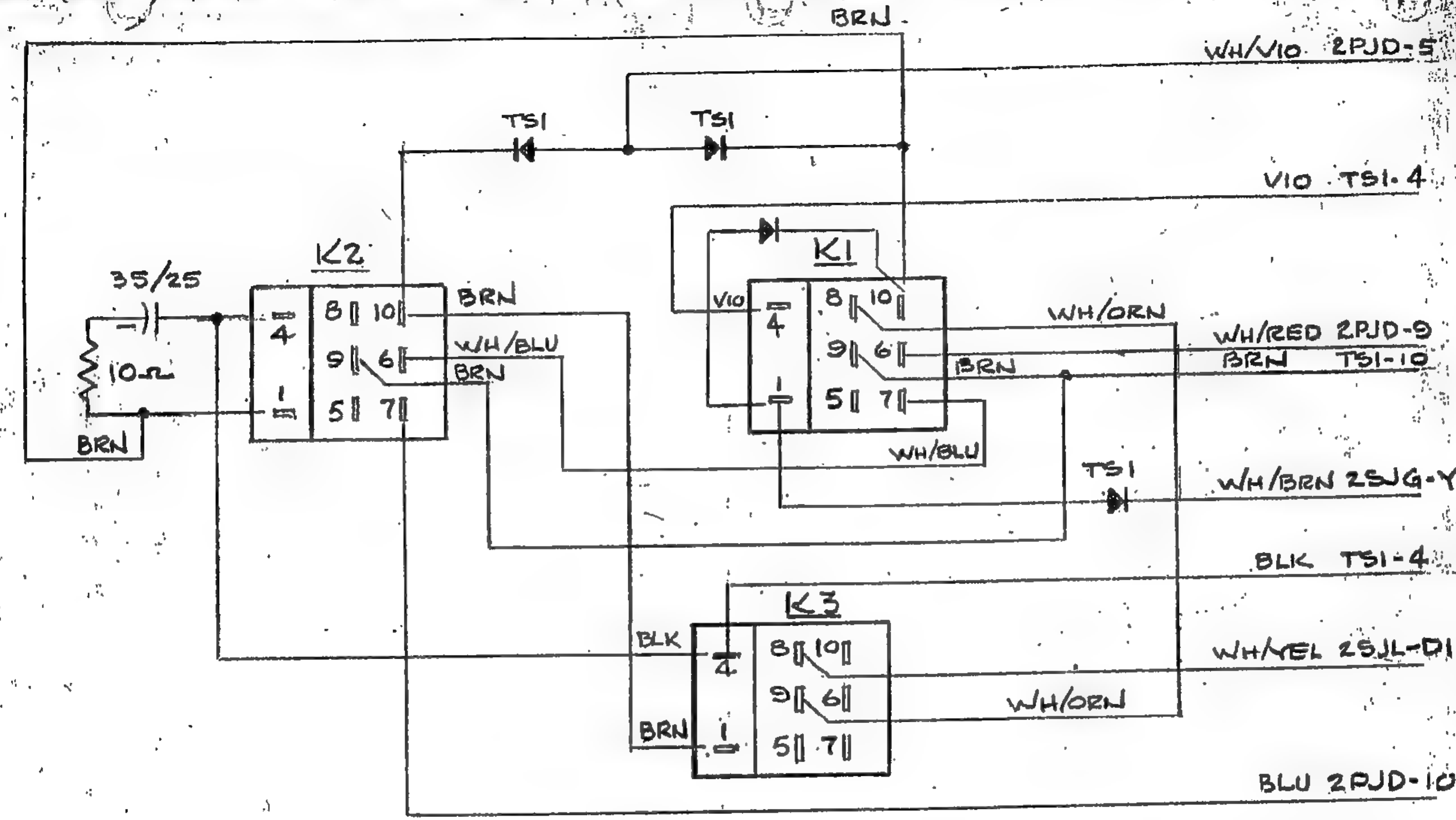
SCALE:	APPROVED BY:	DRAWN BY GEIER
DATE: 20 APR 78		REVISED

SCHEMATIC - C10196 CARD
REGULATOR BOARD - POWER SUPPLY

MODEL 821 B-24-QII

DRAWING NUMBER

PRINTED ON NO. 1000H CLEARPRINT



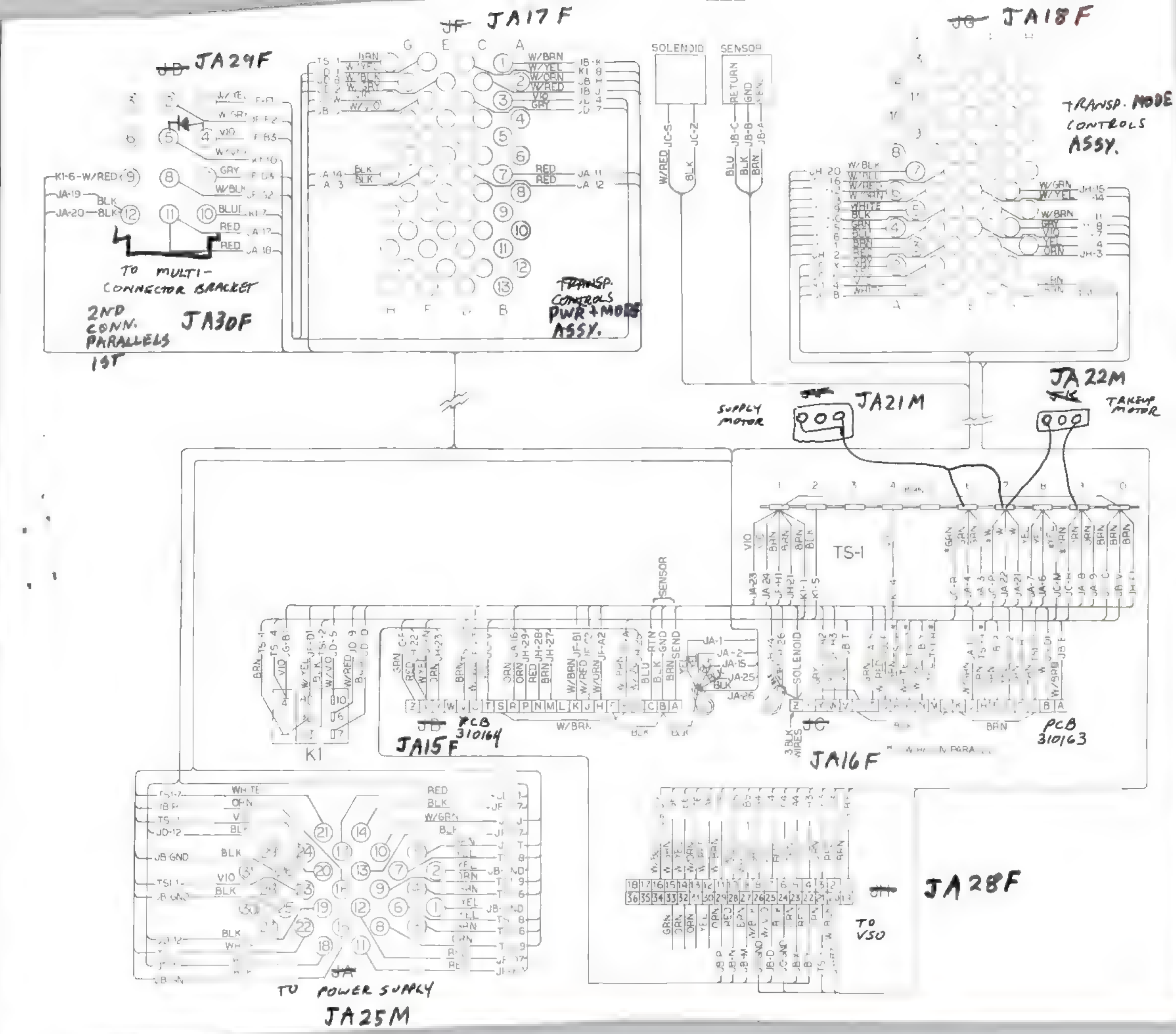
STEPHENS ELECTRONICS, INC.

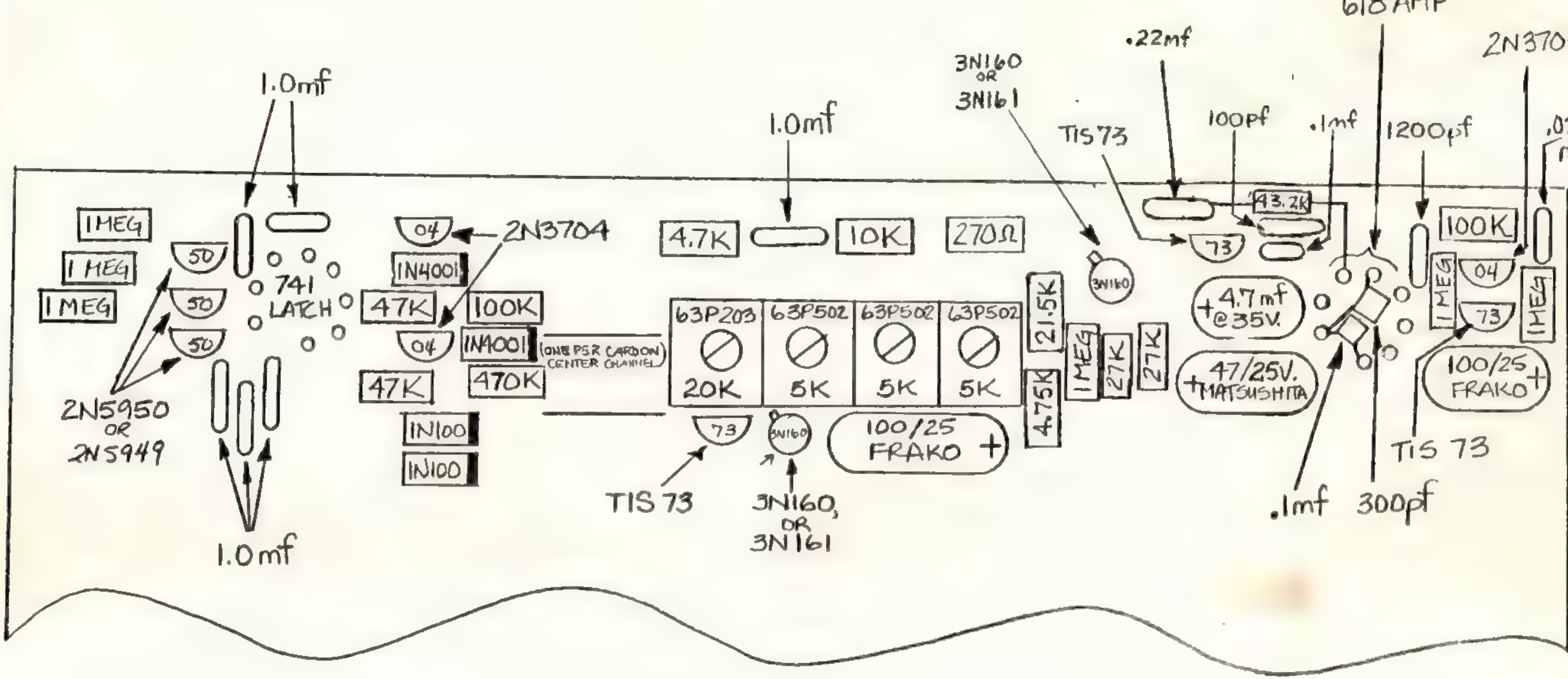
SCALE: —
APPROVED BY:
DRAWN BY GEIER
DATE: 20 APR 78
REVISED

INTERCONNECTION DIAGRAM
RELAYS

MODEL 821B-24-OT

DRAWING NUMBER

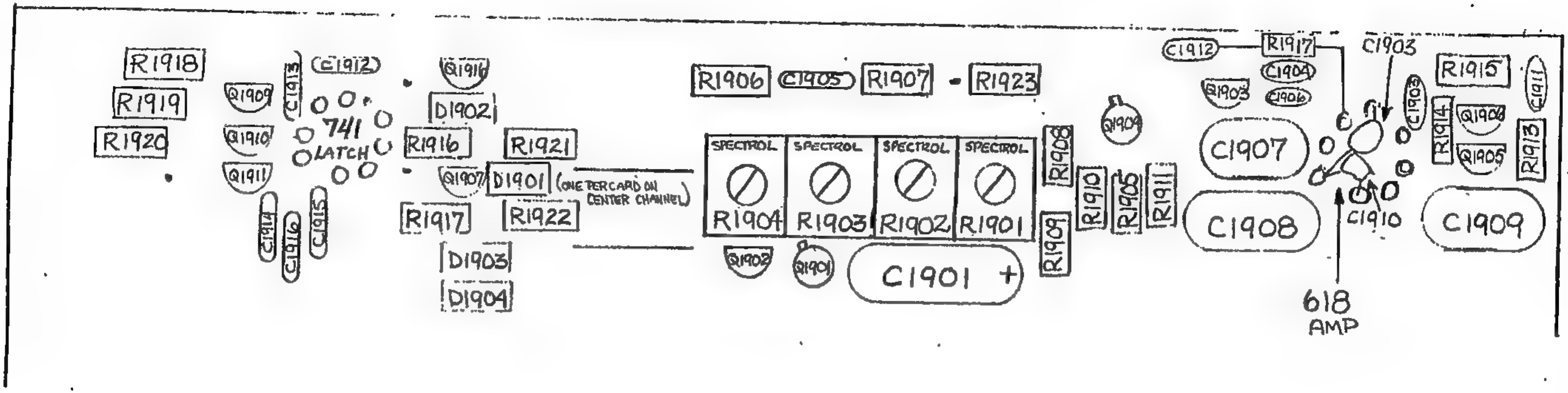

JA17F
JA18F
JA29F
TRANSP. MODE CONTROLS ASSY.
TO MULTI-CONNECTOR BRACKET
2ND CONN. PARALLELS 1ST
JA30F
TRANSP. CONTROLS PWR + MODE ASSY.
SOLENOID
SENSOR
JA21M
SUPPLY MOTOR
JA22M
TAKEUP MOTOR
TS-1
K1
PCB 310164
JA15F
PCB 310163
JA16F
JA28F
TO VSO
TO POWER SUPPLY
JA25M



STEPHENS ELECTRONICS		
SCALE:	APPROVED BY:	DRAWN BY GD
DATE: 13 MAY 80		REVISED 7-80 DC
LINE AMPLIFIER 310159C LAYOUT BY PART VALUE		
		DRAWING NUMBER

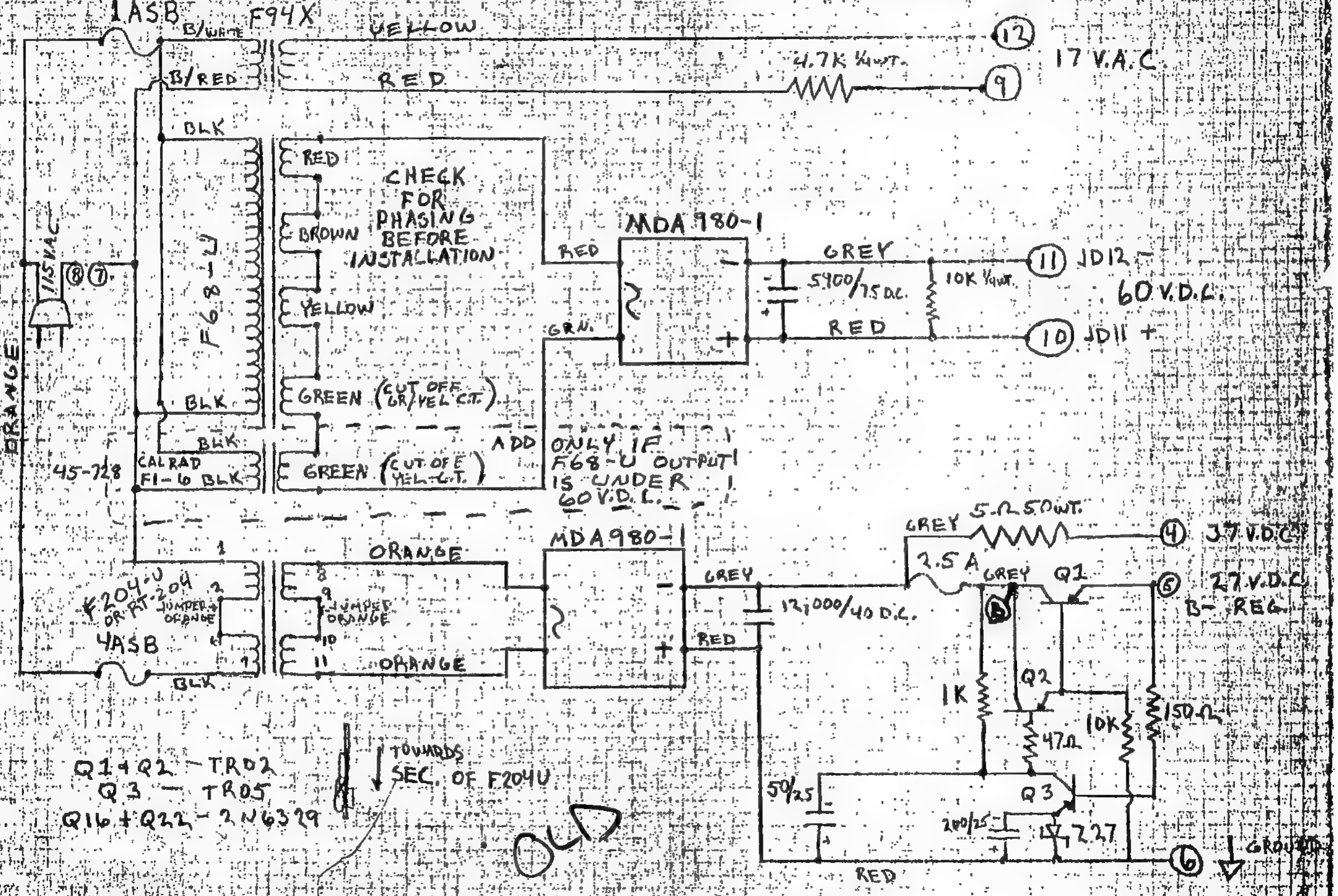
STEPHENS ELECTRONICS

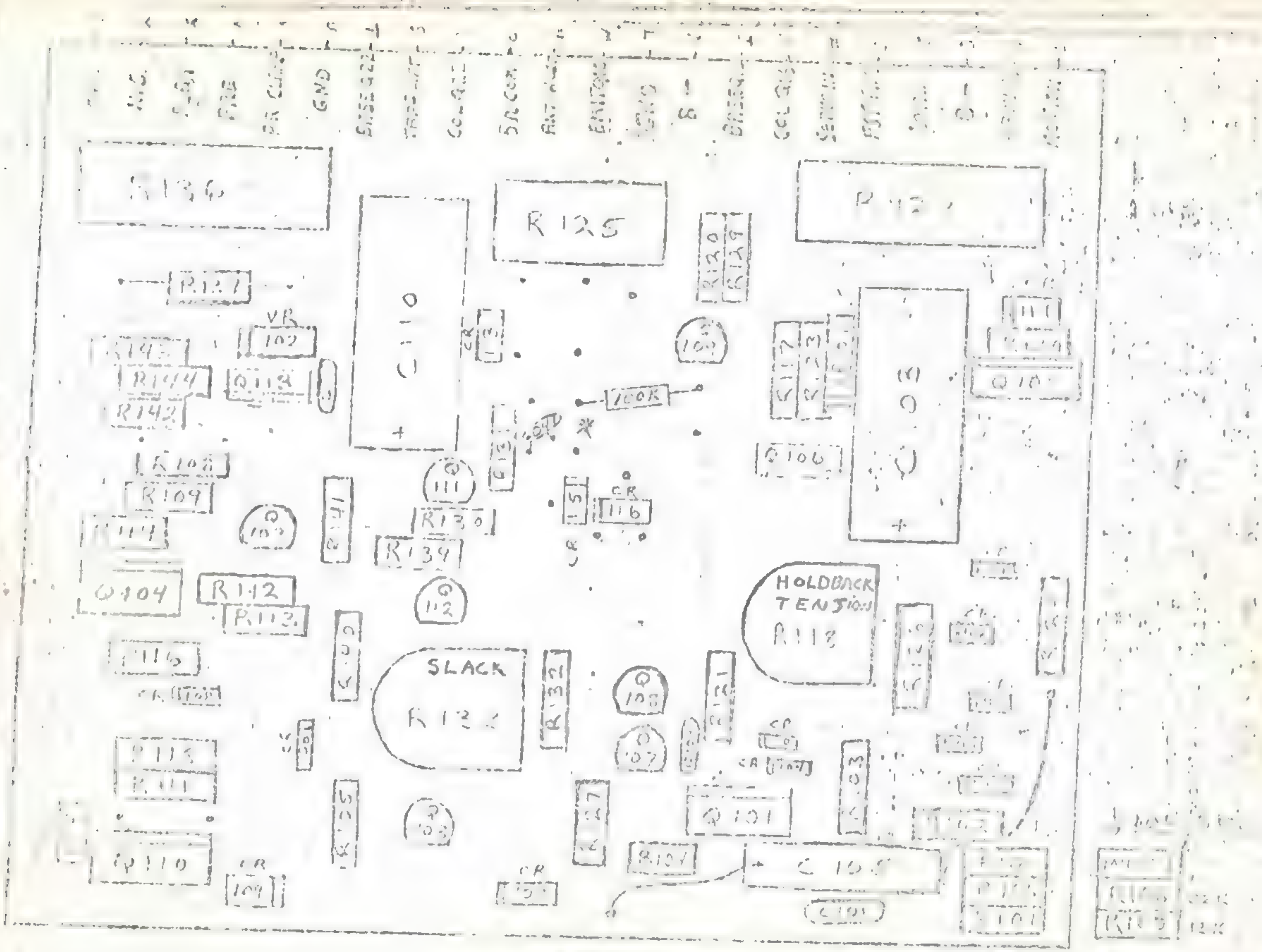
LINE AMPLIFIER 310159C 7/80



1/11/74

CIRCLED NUMBERS (1) ARE DRAWING REFERENCE NUMBERS





→ PAST MODIFICATION PARTS IN RED, NO LONGER USED ON NEW MACHINES CHECK SECOND PAGE FOR PRESENT FORMAT

STEPHENS ELECTRONICS, INC.

SCALE: 2:1

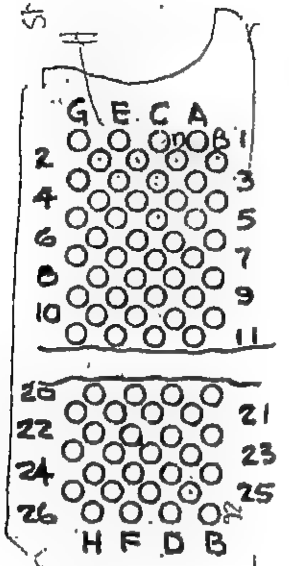
APPROVED BY:

DATE: 10/15/74

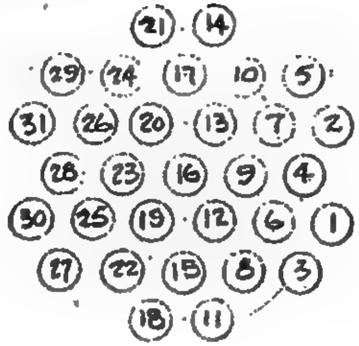
anti-bust mod.

~~4/7/77~~

ACEG = ODD
B,DFH = Even



AMPHENOL
SERIES 220 104 series
Back of male,
ZN104



AMPHENOL
SERIES 222

1	2	3
4	5	6
7	8	9
10	11	12

API
SERIES 1-480XXX-0

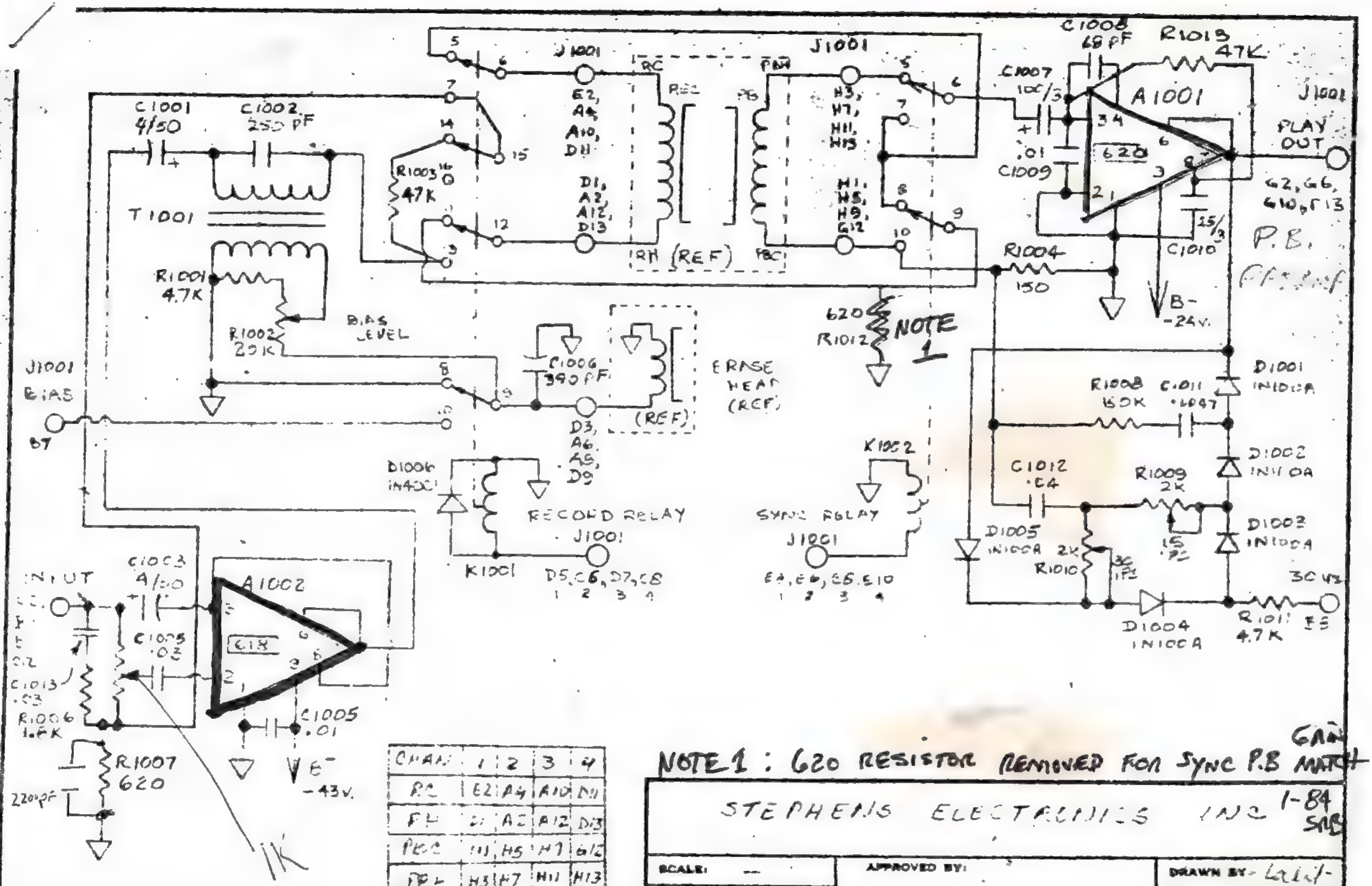
STEPHENS ELECTRONICS, INC.

SCALE: —	APPROVED BY:	DRAWN BY Geier
DATE: 24/APR/78		REVISED

CONNECTOR PIN CONFIGURATIONS

MODEL 821B-24-QII

DRAWING NUMBER



CHAN	1	2	3	4
RC	E2	A4	A10	D11
RH	D1	A2	A12	D13
PBC	H1	H5	H9	G12
PBH	H3	H7	H11	H13
E	D3	A6	A8	D9

AMPHENOL CONN. PIN NUMBERS CARRYING SIGNAL TO HEAD STACK

NOTE 1: 620 RESISTOR REMOVED FOR SYNC P.B GAIN MATCH

STEPHENS ELECTRONICS INC 1-84 SAB

SCALE: —	APPROVED BY:	DRAWN BY:
DATE: 6/6/75		REVISED 3/5/79

PRE AMP ELECTRONICS

811-D 3100

DRAWING NUMBER 110912-C

9/23/85

NEW STEPHENS ALIGNMENT

Playback: - 1K @ 0db
- 10K @ -1db (1db lower than 1K, all cases)

RECORD : ★ Have to find optimum Bias for each Batch of Tape using 15hz for test tone
- 1K @ 0db
- 10 @ 0db
- *70 hz @ 0db sync P.B. - adjust low End Playback while in [redacted] Sync
  *Do all Even channells, then do all odd Channells never side by side

★ Bias : 15hz monitor tape return NOT Buss Outputs, (~~Adj~~) Back off Bias level, slowly increase noise reduction into a nul point. Adjust fine tune the nul point. WARNING: Further increase will give a false indication of noise reduction.

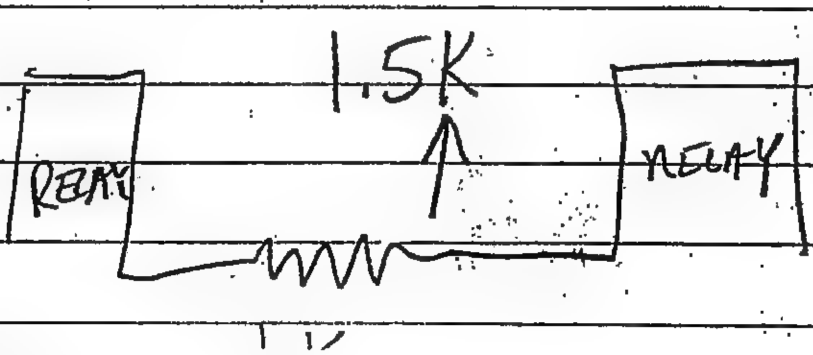
STEVIE C 24 TRK

PUNCH IN POPS:

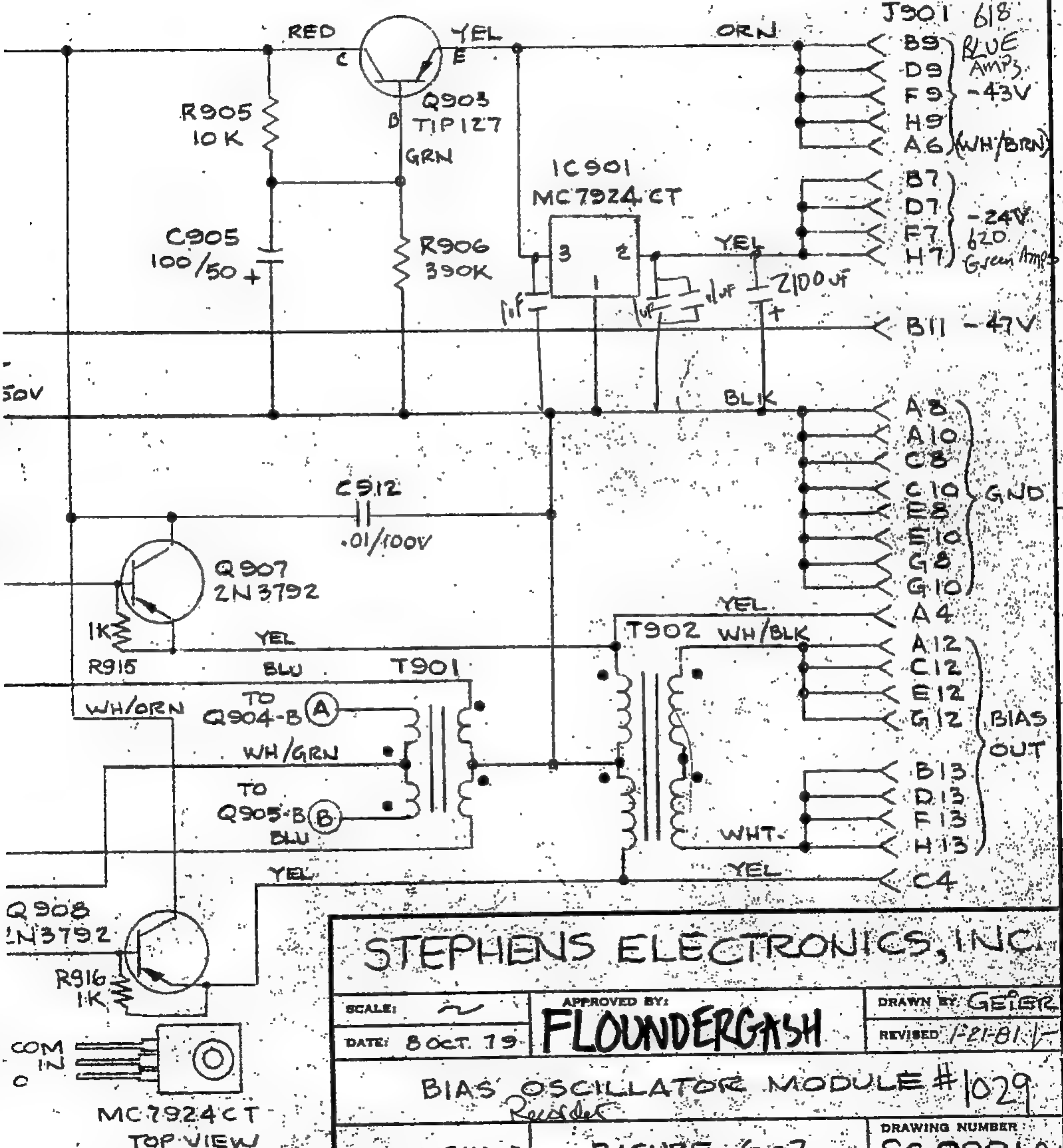
TURN ON TRANSISTOR
SIDE of
ON [illegible] BIAS CARD
ADD 10·20 µf TO THE
47 µf UP ACROSS
THE CARD. THIS WILL
SLOW DOWN THE TURN ON.

TO SLOW DOWN THE
TURN OFF ADD APPROX .5K
TO THE 1.0K RESISTOR
ACROSS THE ADJACENT
RELAYS ON THE UNDER-
SIDE OF THE DECK.

OVER →



REVISIONS			
LTR	DESCRIPTION	DATE	BY
A	WAS DWG. NO. 110902-C MODEL WAS 821B, Remove R913, R914 R911 was 1.5K C909 was 25/50V	1-23-81	B Cike



A

B

STEPHENS ELECTRONICS, INC.

SCALE: ~	APPROVED BY: FLOUNDERGASH	DRAWN BY: GEIER
DATE: 8 OCT. 79		REVISED 1-21-81 1-90

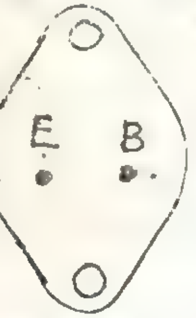
BIAS OSCILLATOR MODULE #1029
Recorder

MODEL 811D	FIGURE 6-7	DRAWING NUMBER SC-0901 A

FLOUNDERGASH 6/89

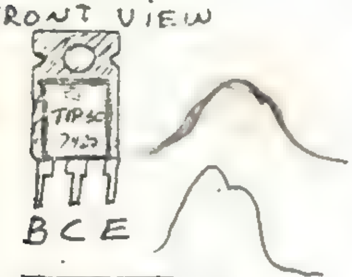
POWER TRANSISTORS

BLACK = HOT
SHIELD

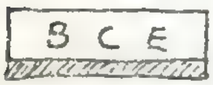


BOTTOM VIEW

FRONT VIEW

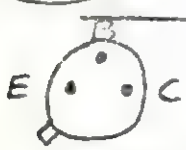


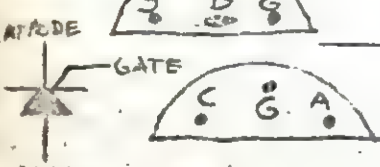
BCE



BOTTOM VIEW

BOTTOM VIEWS





TYPE	POLARITY	+ LEAD	− LEAD	RESISTANCE
TR02	PNP	E	B	22 Ω
		E	C	22 Ω
2N3792	PNP	B	C	65 Ω
		B	E	65 Ω
2N6329				
TIP 29		C	B	65 Ω
		E	B	65 Ω
TIP 30	PNP	B	C	65 Ω
		B	E	65 Ω
TIP 42		B	C	65 Ω
		B	E	65 Ω
TIP 121 (120)		C	B	69 Ω
		C	E	61 Ω
		E	B	122 Ω
TIP 125		B	C	71 Ω
		B	E	130 Ω
TIP 127		B	C	71 Ω
		B	E	130 Ω
2N3702	PNP	B	C	45 Ω
		B	E	45 Ω
2N3704	NPN	C	B	45 Ω
		E	B	45 Ω
2N3707	NPN			
TR05				
2N3819	FET	DS	SD	(x100 SCALE) 200 Ω
		DS	G	3K Ω
TIS 73	FET	DS	SD	20 Ω
		DS	G	55 Ω
TIC 45	SCR	C	G	60 Ω
3N160				

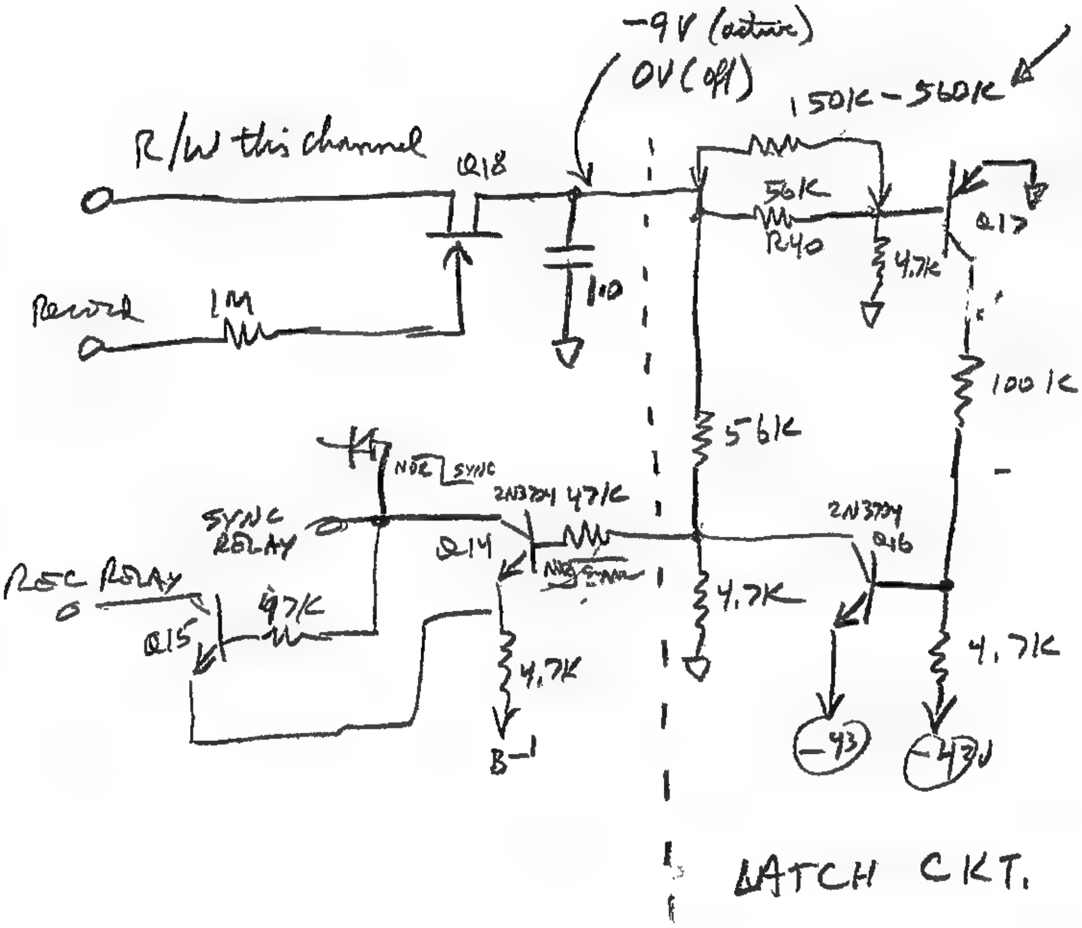
on Madelon mach. only

Record Latch Ckt

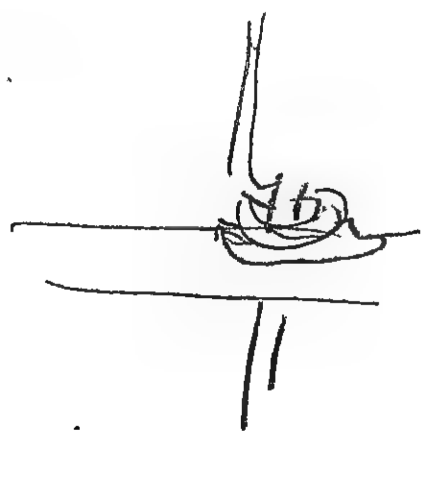
Stephens 821A
4400 Line amp card.

Latch dropout prevention

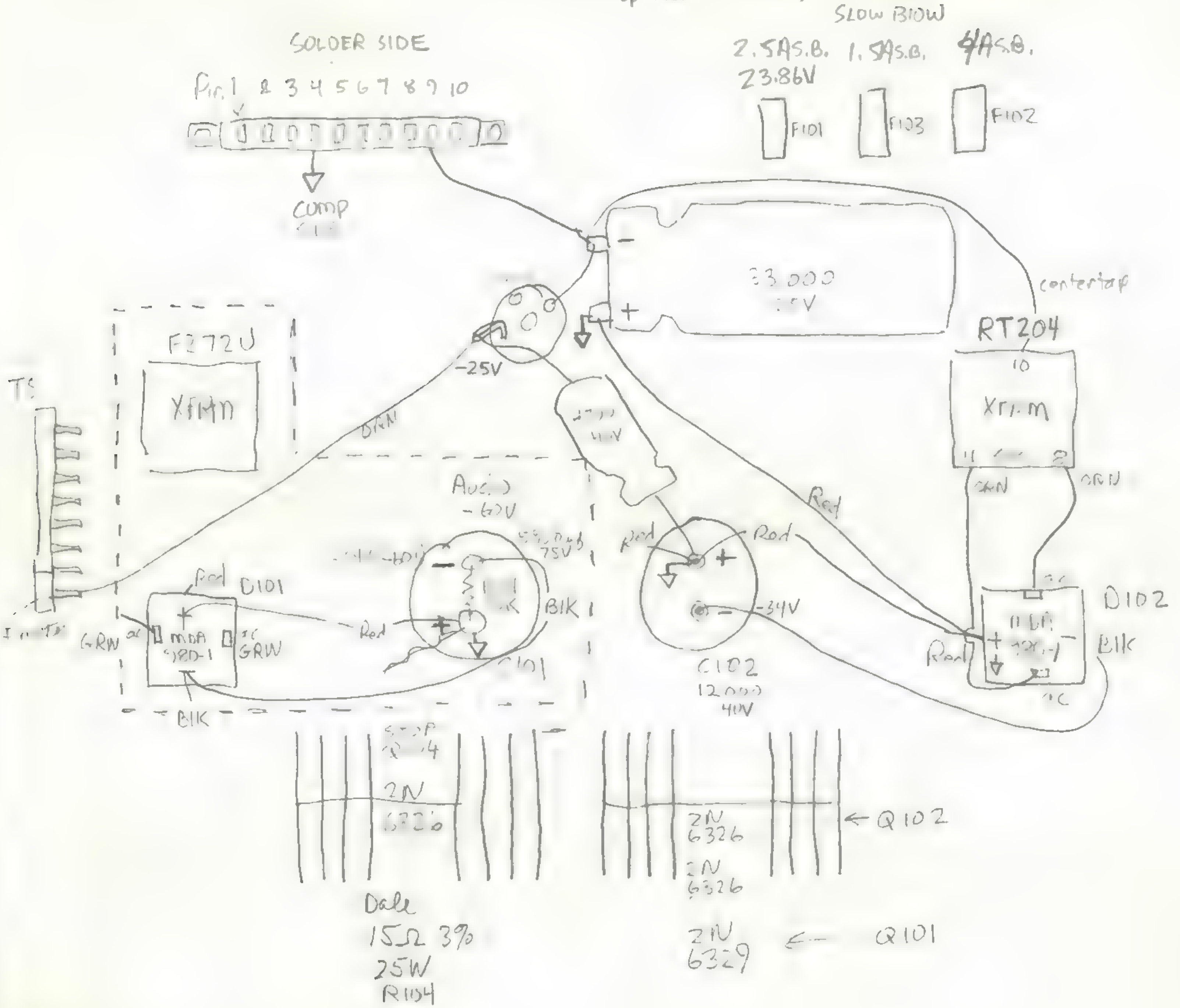
in active mode,

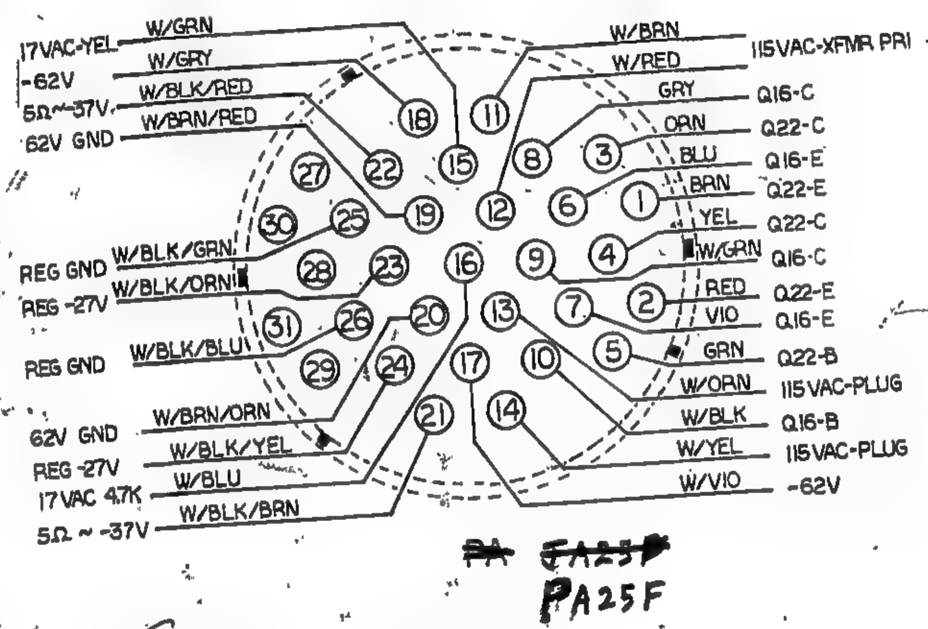


Lowers R40's effective resistance thus causing more current to flow thru Q17 Base, 2N3702 thus turning it on harder. it in turn turns on Q16 harder which keeps Q17 base on

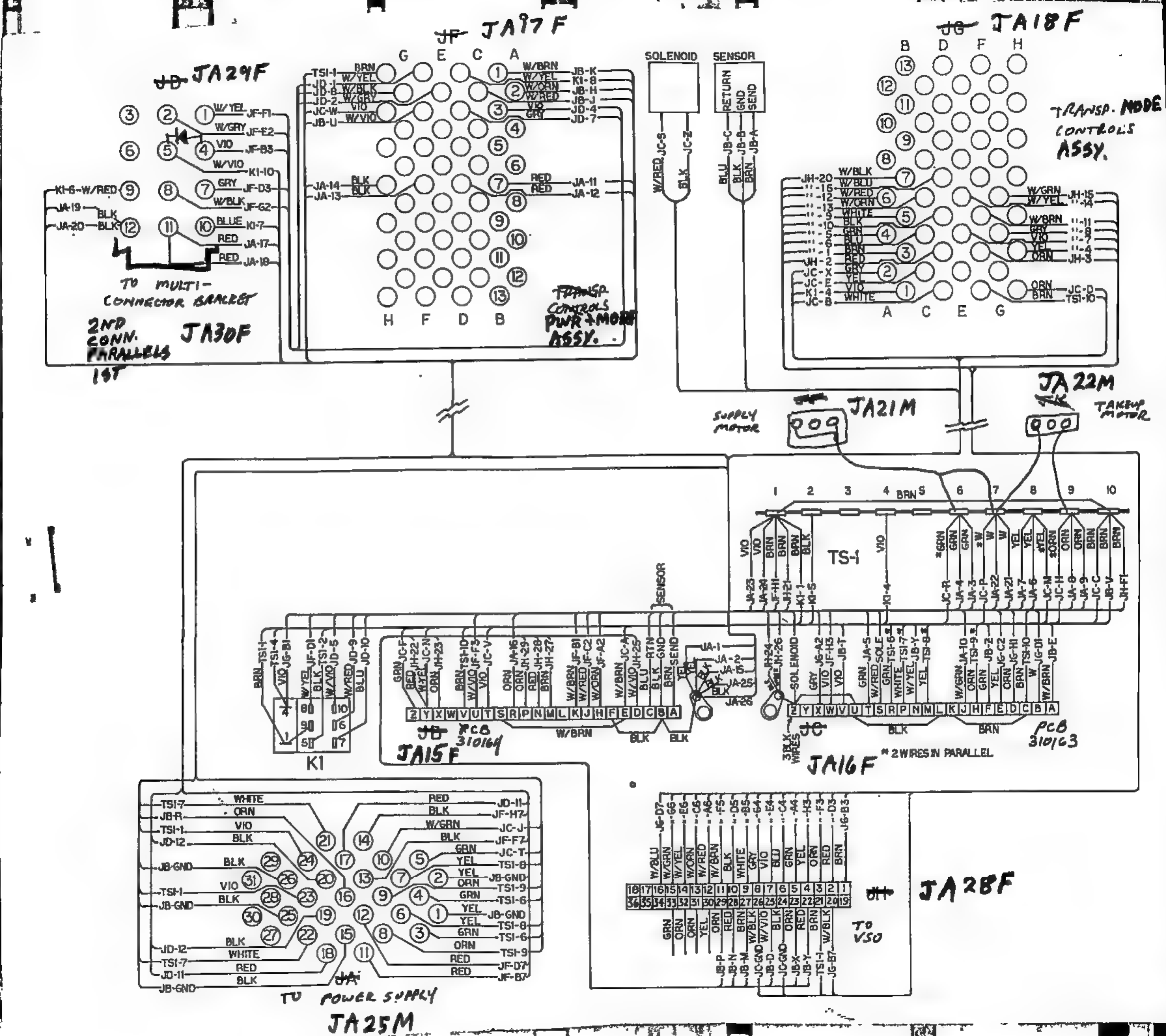


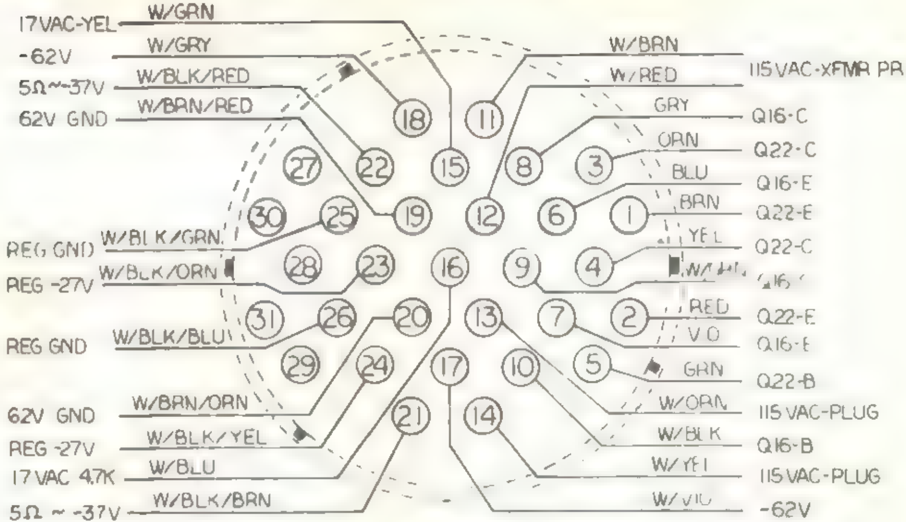
821B Power Supply ?





Power Supply cable


JF JA17F
JB JA29F
JG JA18F
SOLENOID
SENSOR
RETURN
GND
SEND
TRANSP. MODE CONTROLS ASSY.
TO MULTI-CONNECTOR BRACKET
2ND CONN. PARALLELS 1ST
JA30F
TRANSP. CONTROLS PWR + MODE ASSY.
SUPPLY MOTOR
JA21M
JA22M
TAKEUP MOTOR
TS-1
SENSOR
K1
JB JA15F
PCB 310164
JC JA16F
PCB 310163
* 2 WIRES IN PARALLEL
3 BLK WIRES
JA28F
TO VSO
JA
TO POWER SUPPLY
JA25M

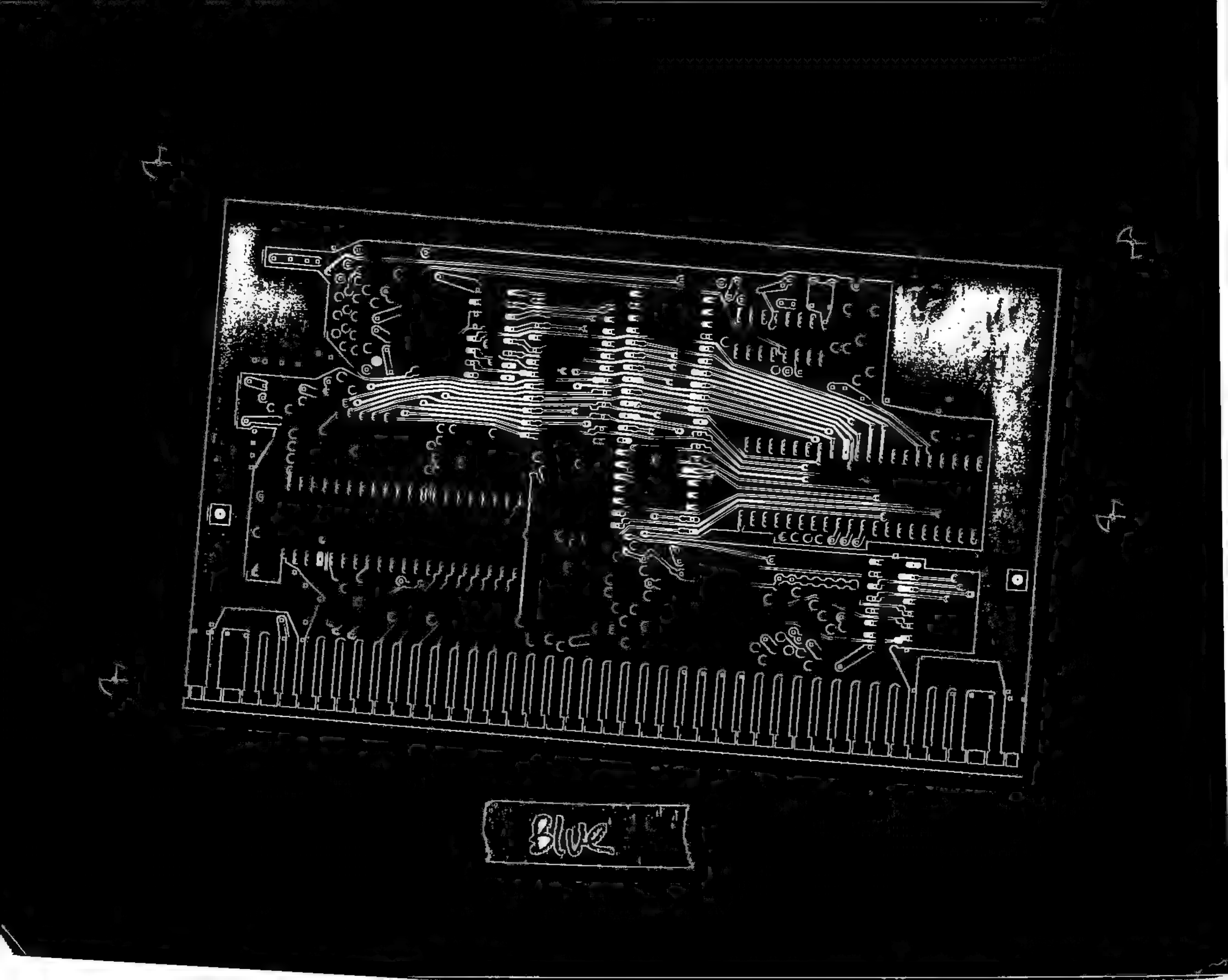


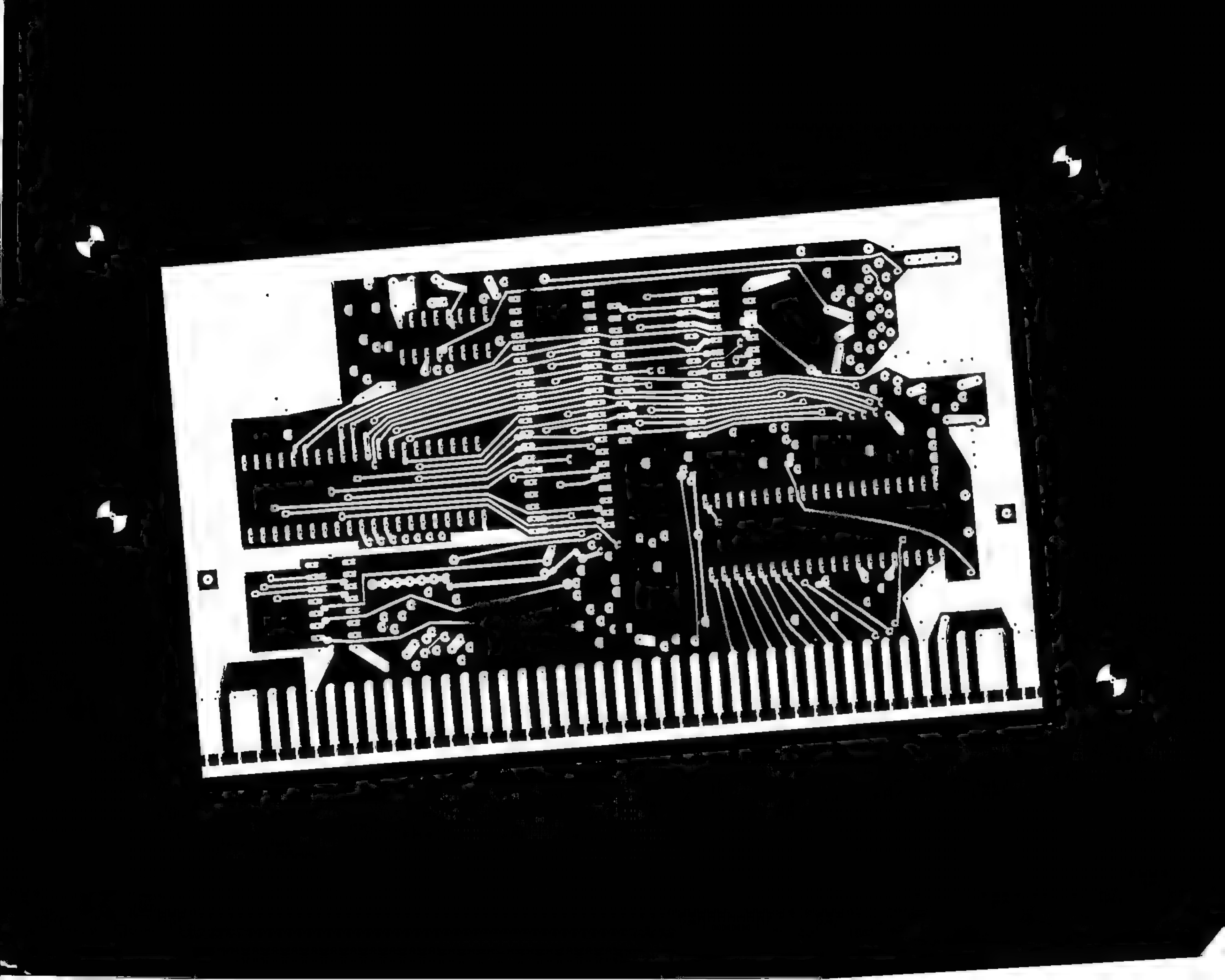
~~PA~~ ~~JA25P~~
PA25F

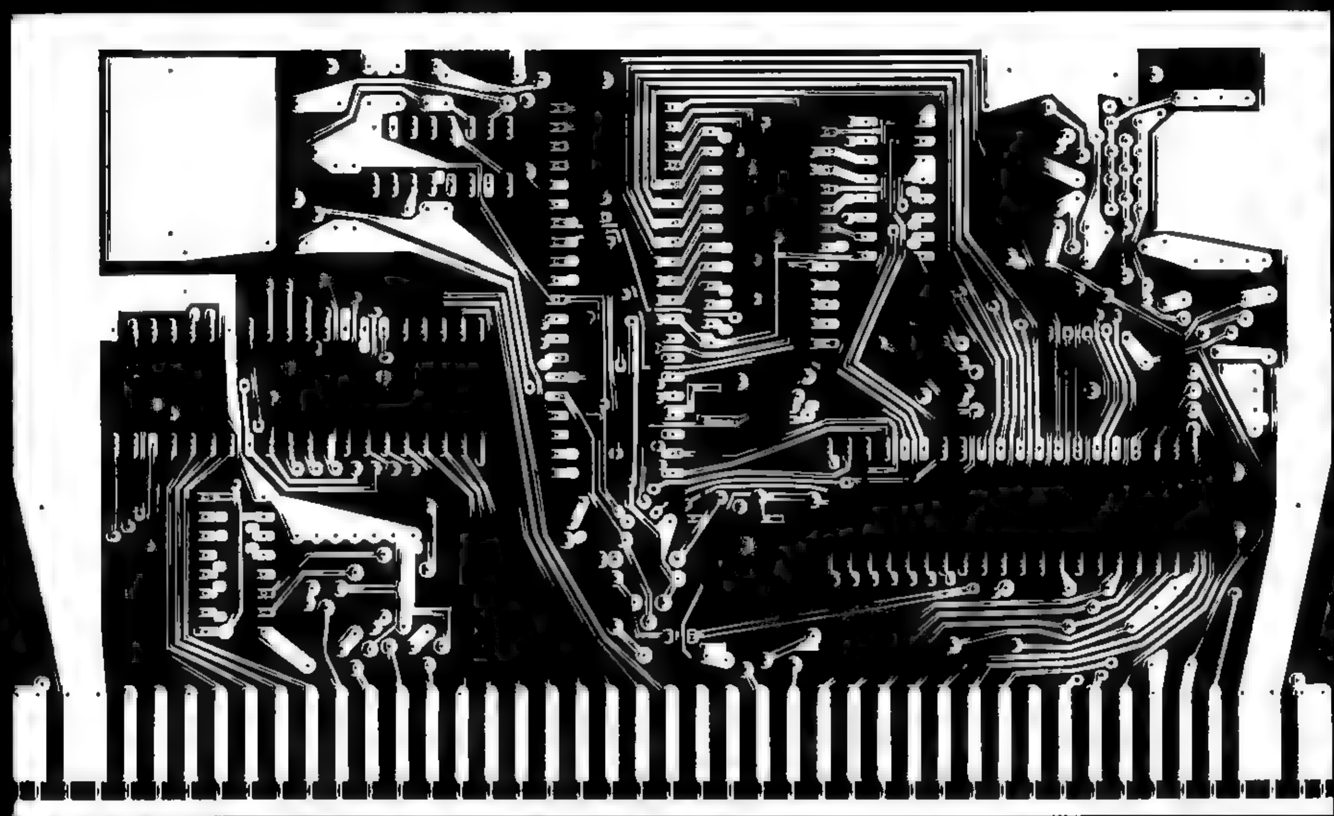
Power Supply cable

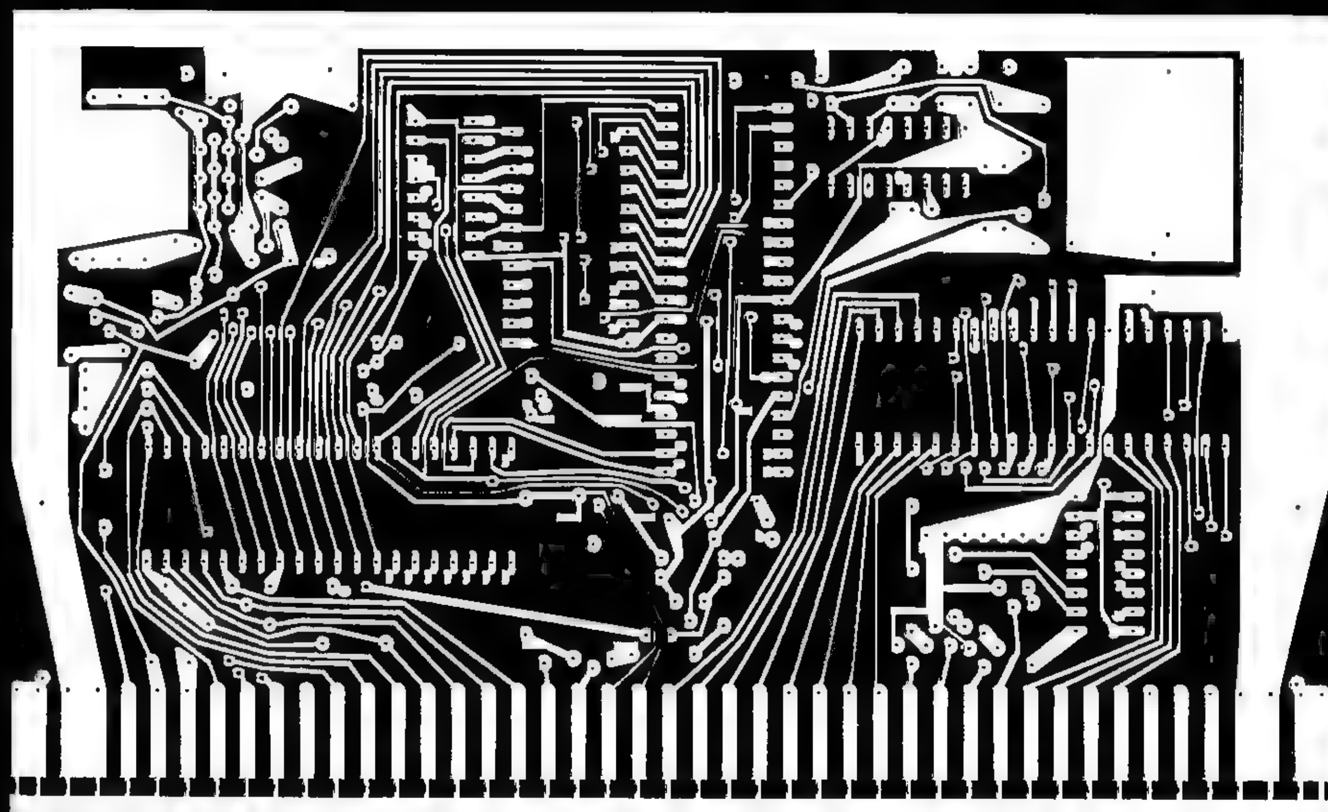
2" Lifter Assy
93-4210-0352
3M-79

Bill Ravenscroft
Specialized Sound
(815)
892-9[illegible]

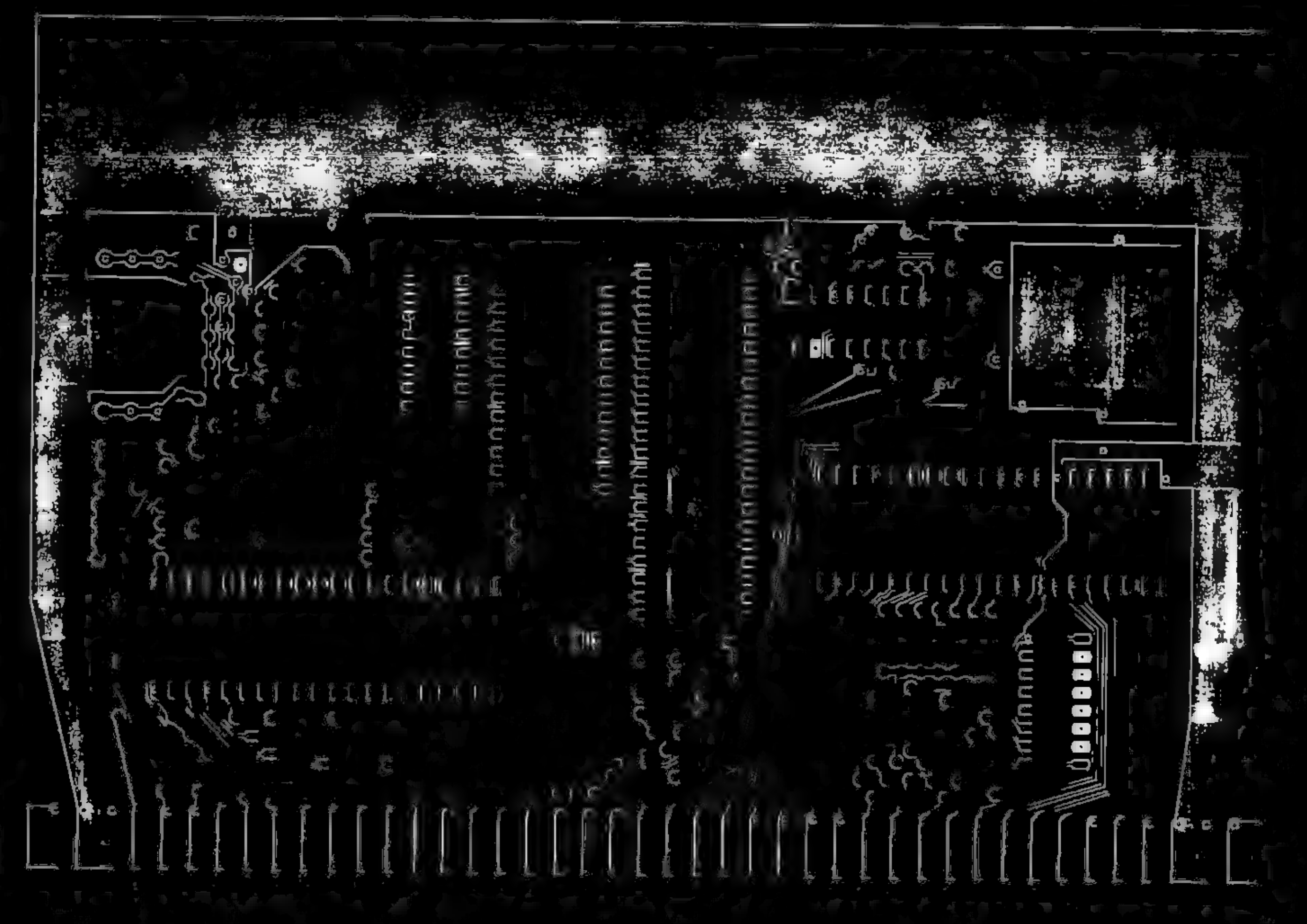

Blue

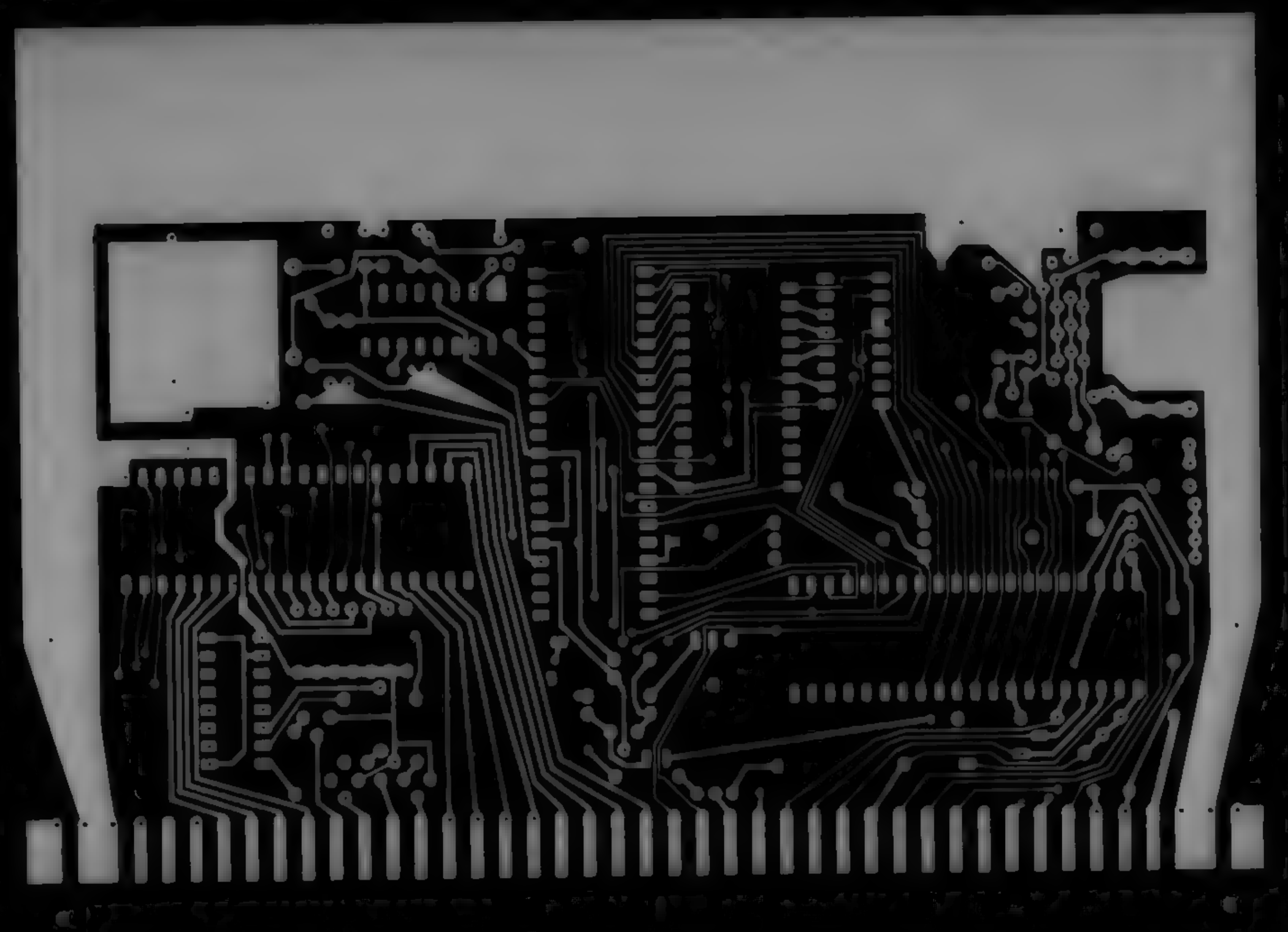


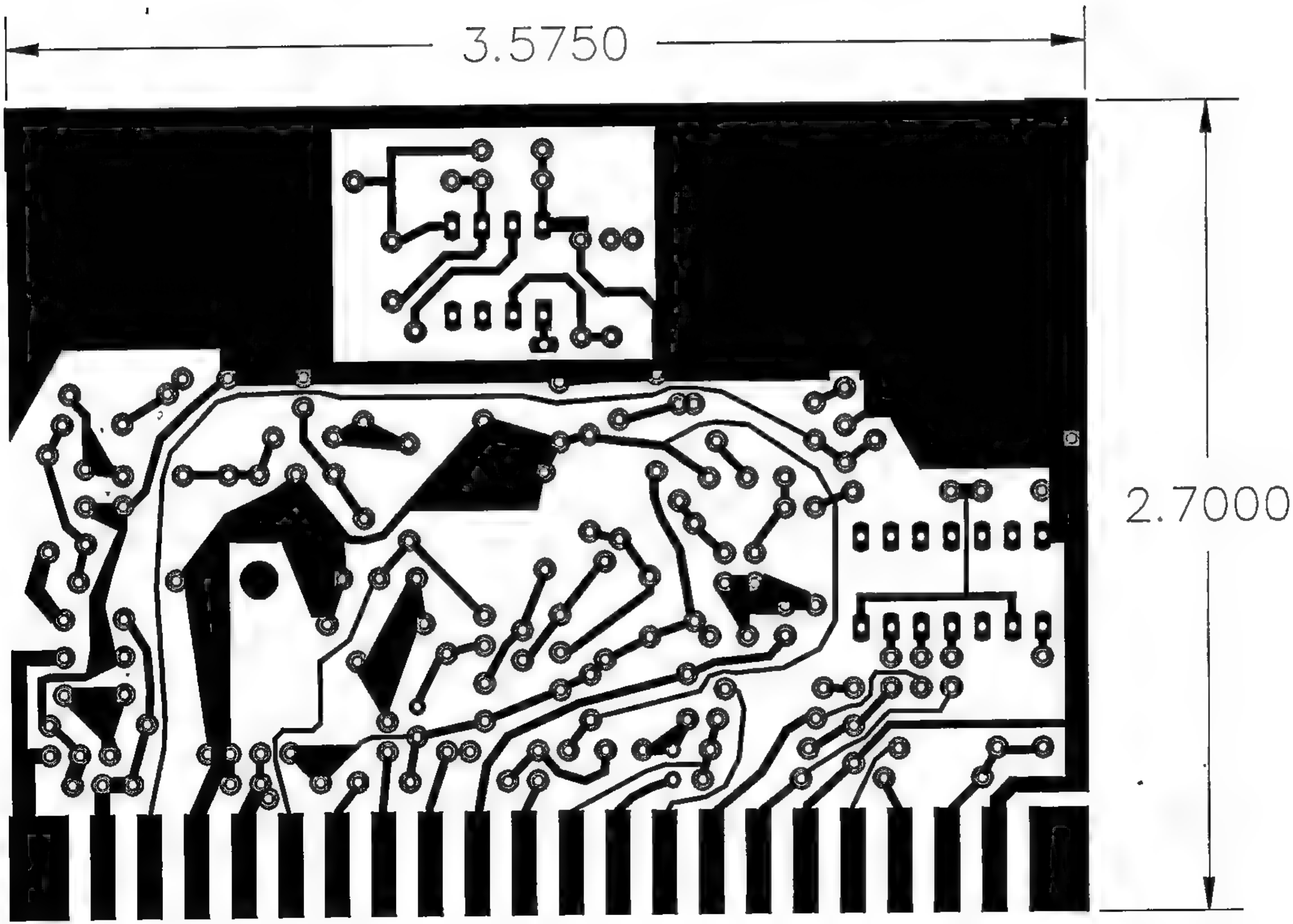


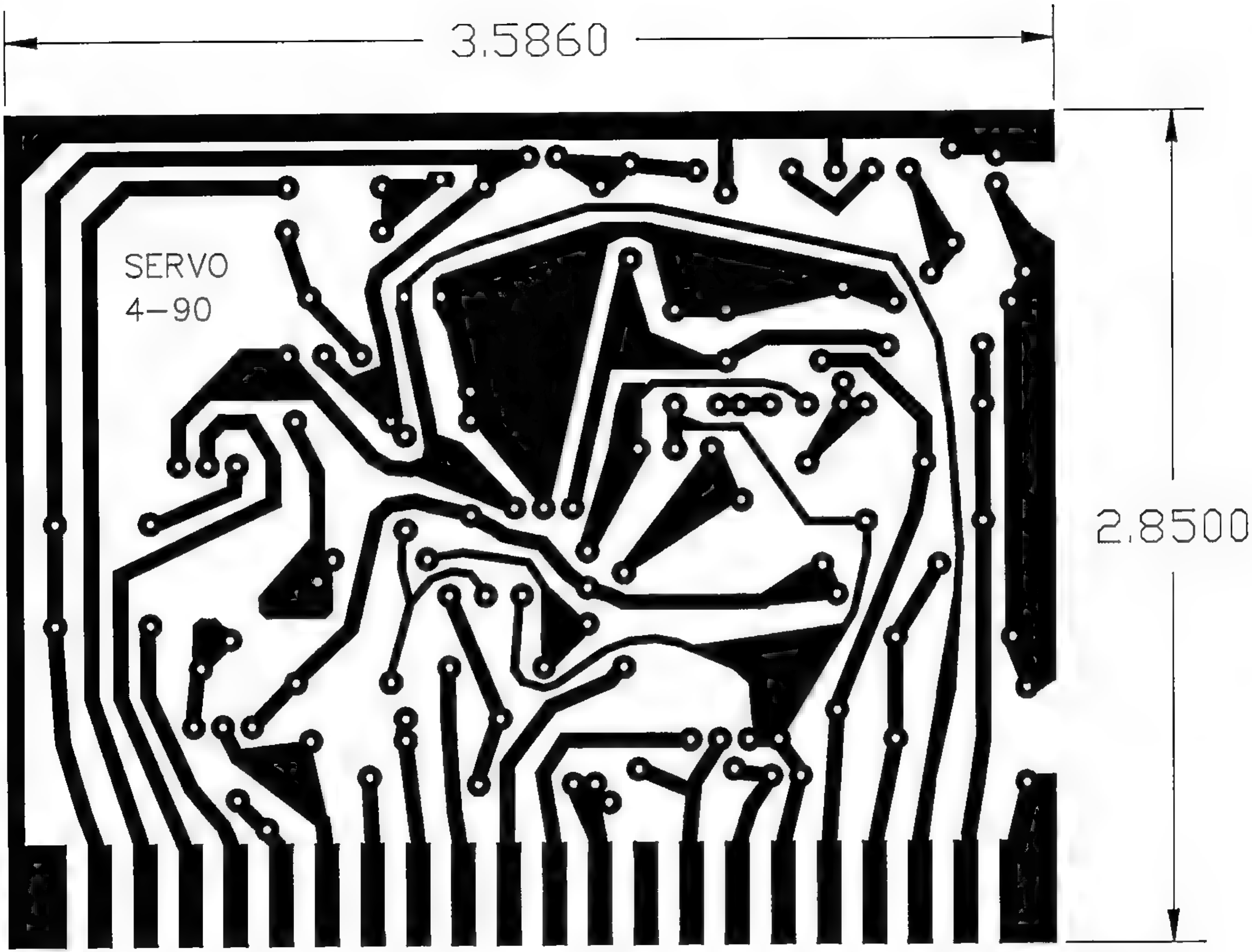


RED



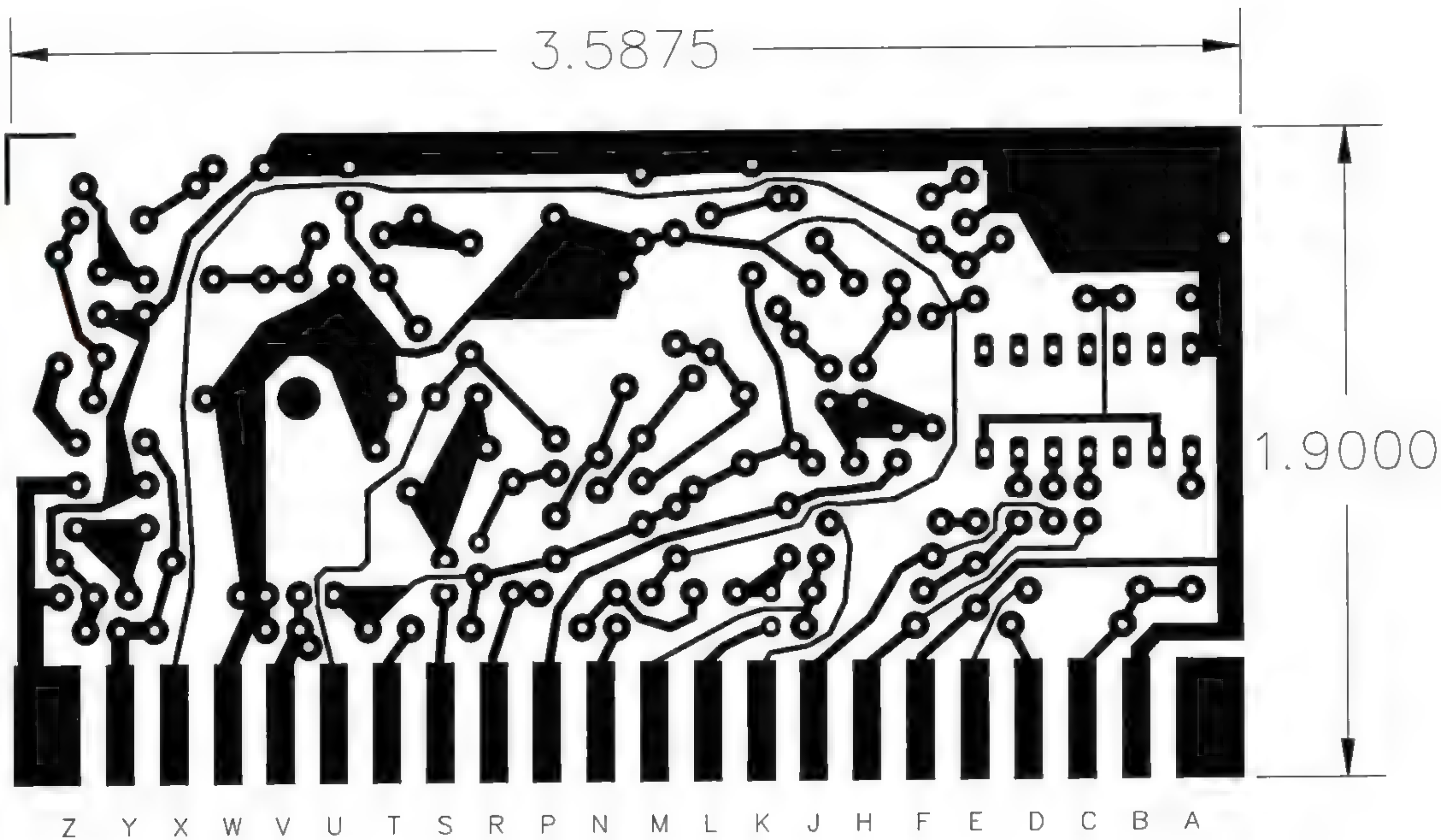


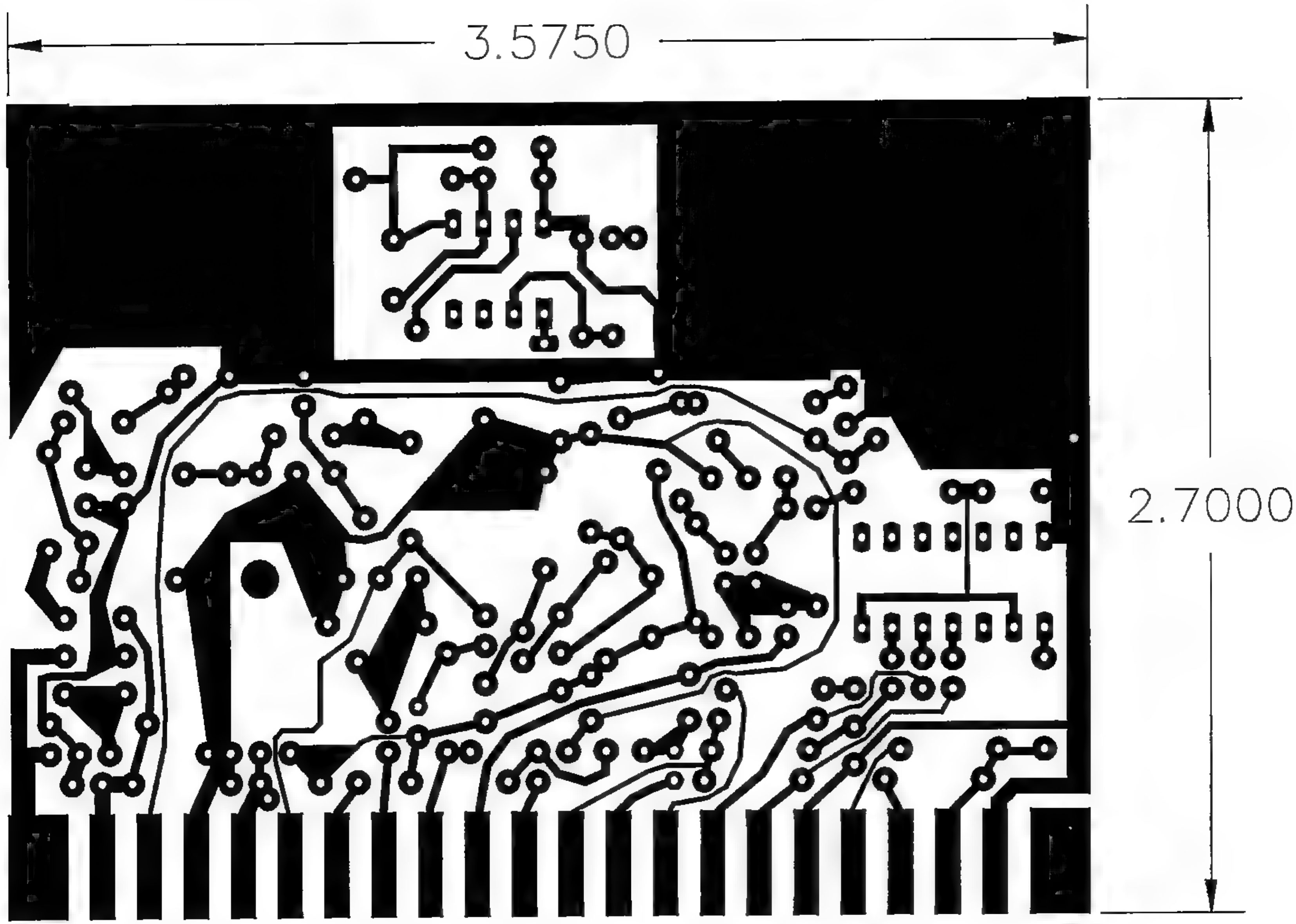

3.5750
2.7000

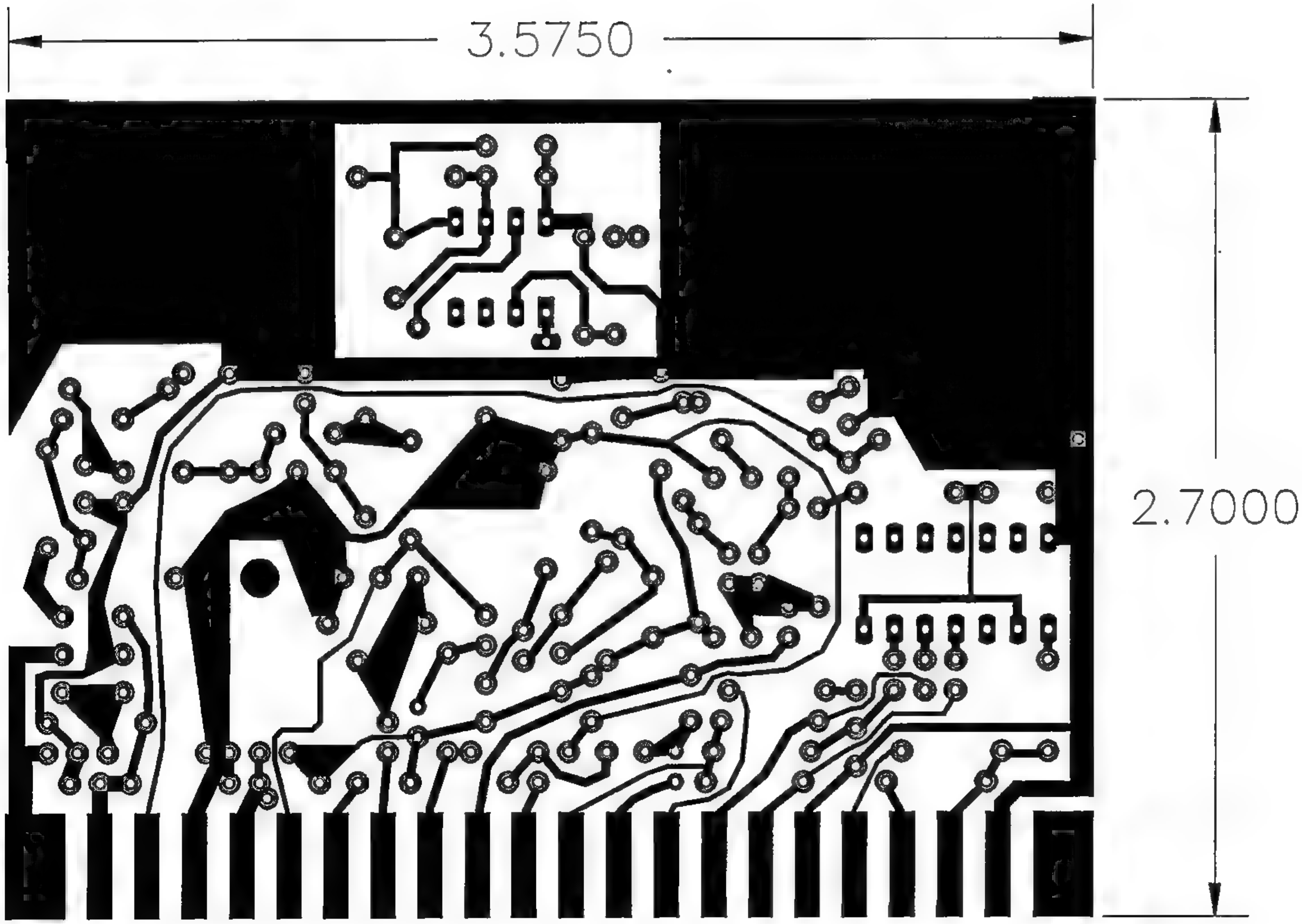


SERVO PCB
SOLDER SIDE

Emulsion Down



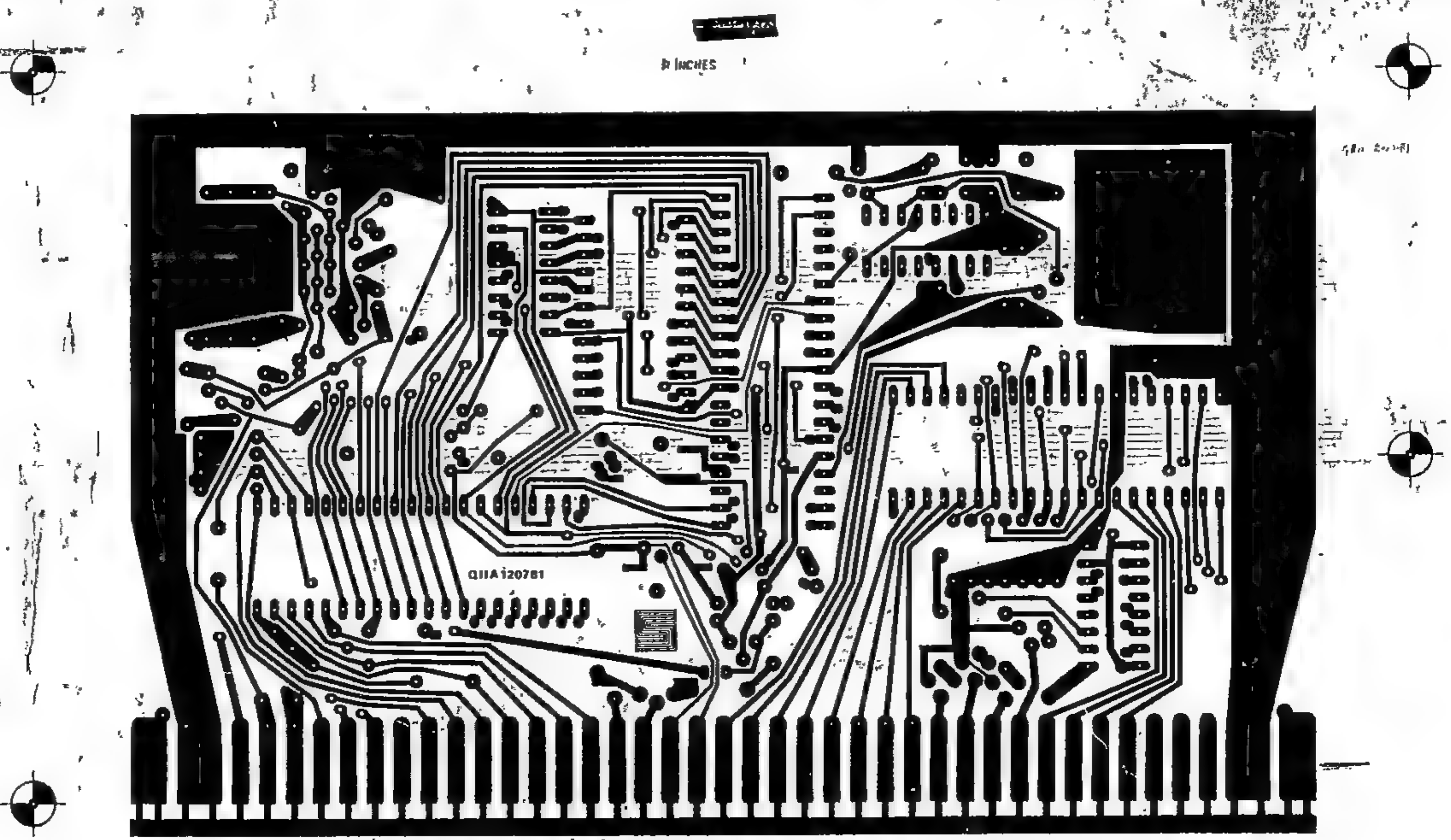

3.5750
2.7000

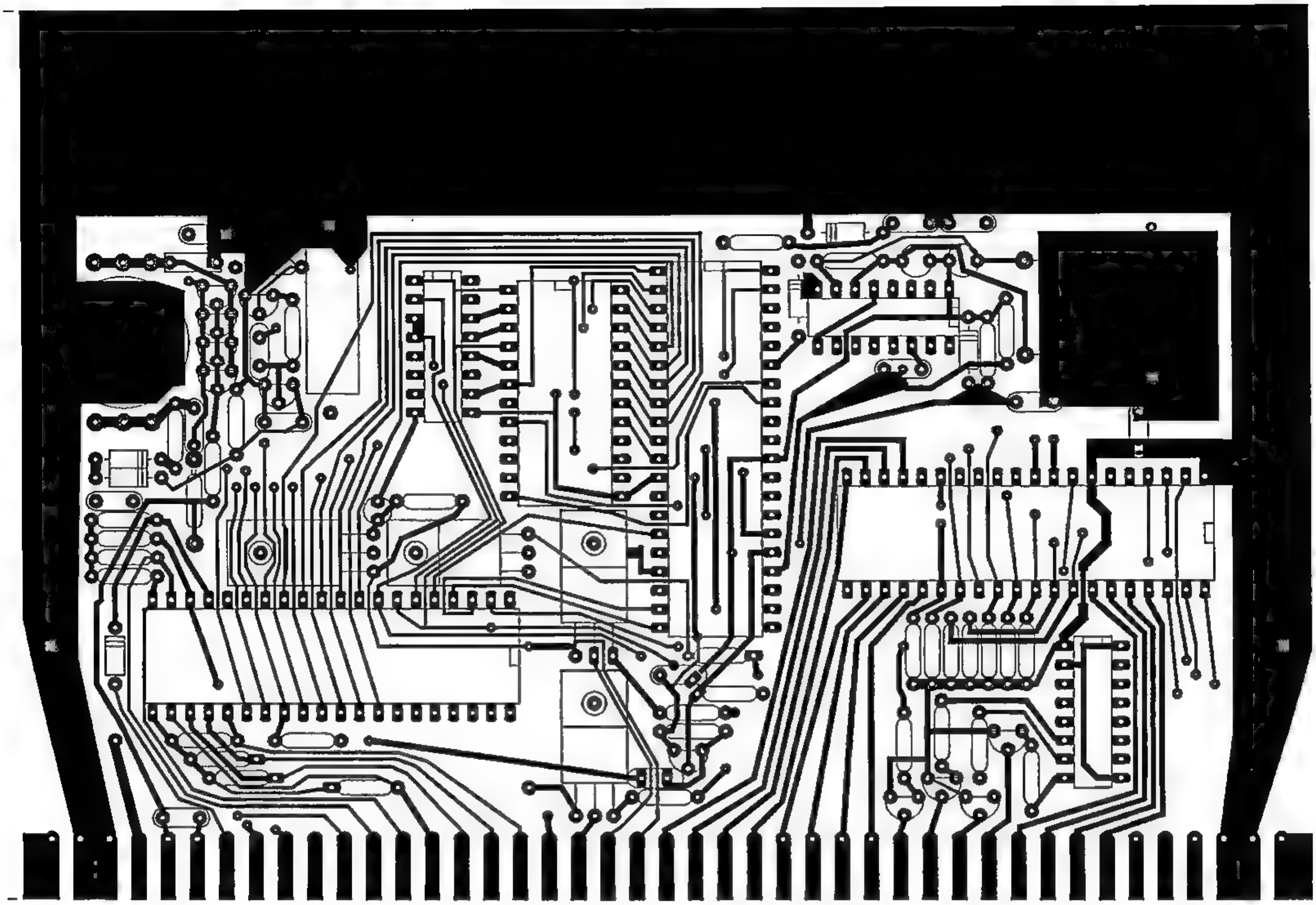

3.5750
2.7000

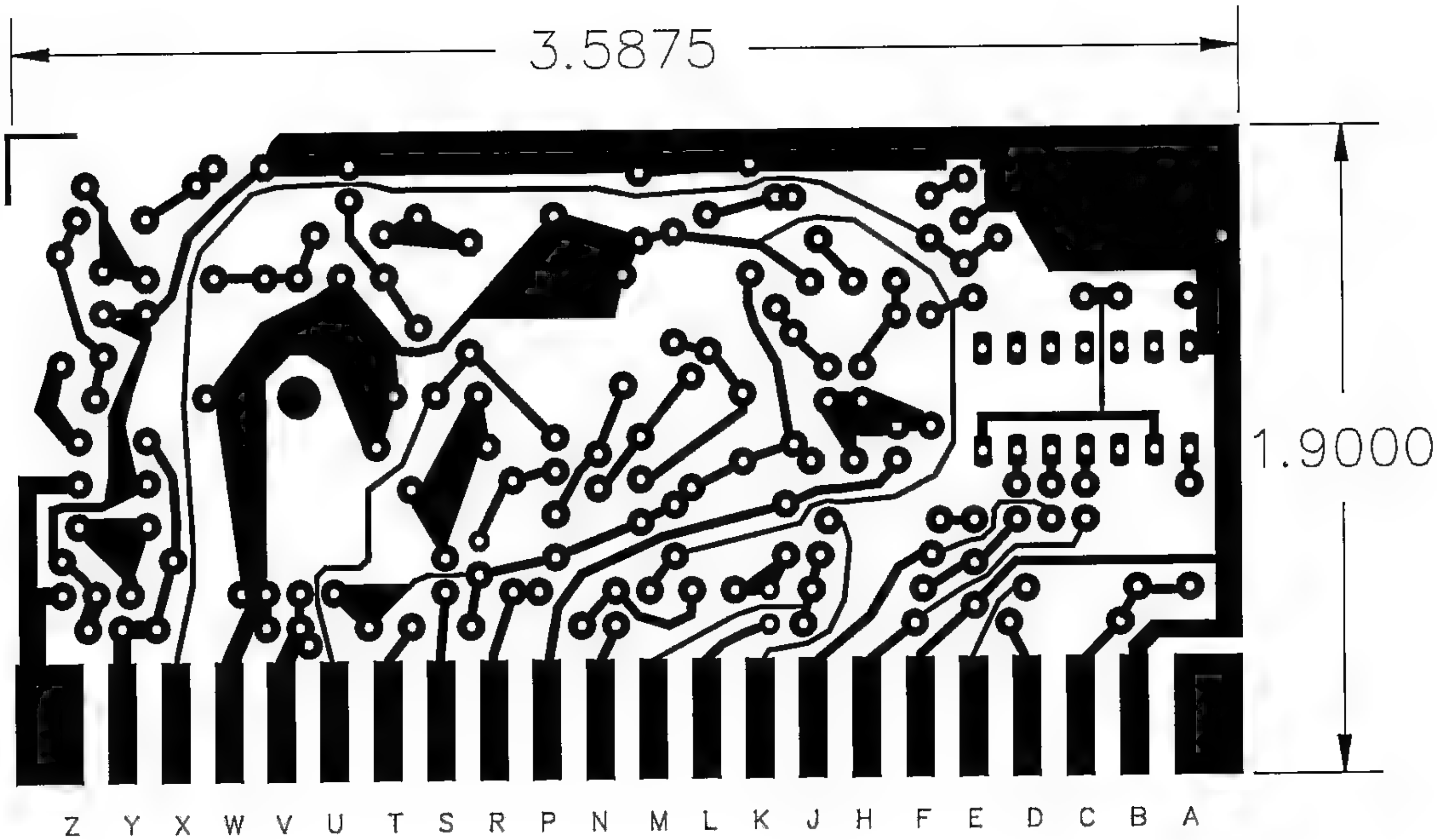
SERVO PCB
SOLDER SIDE

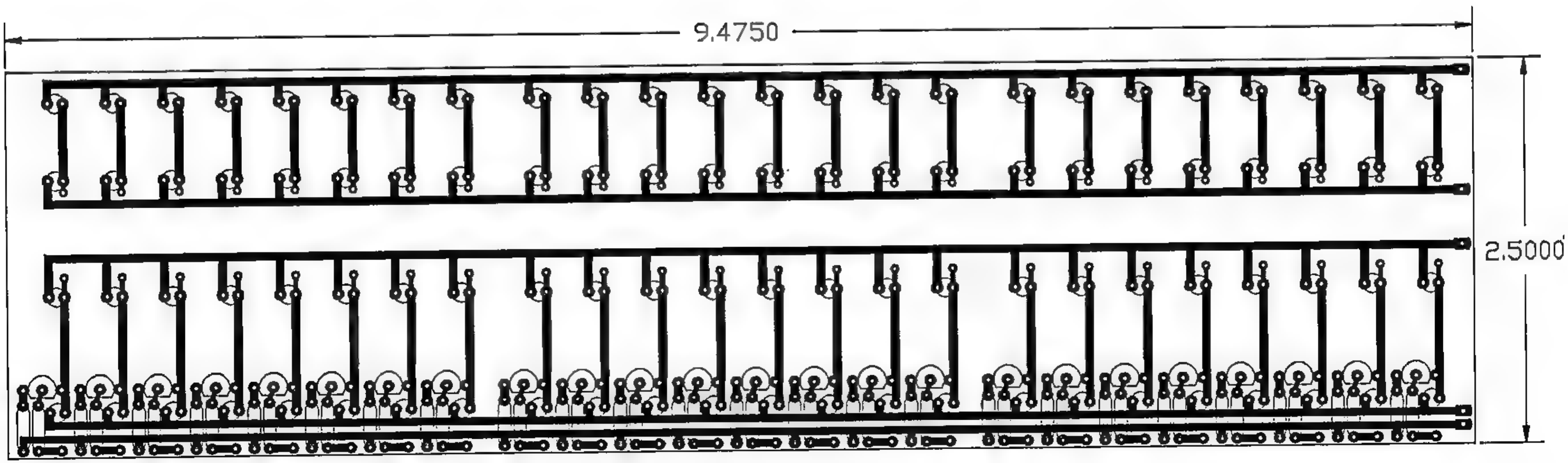
SERVO PCB
SOLDER SIDE

Emulsion Down

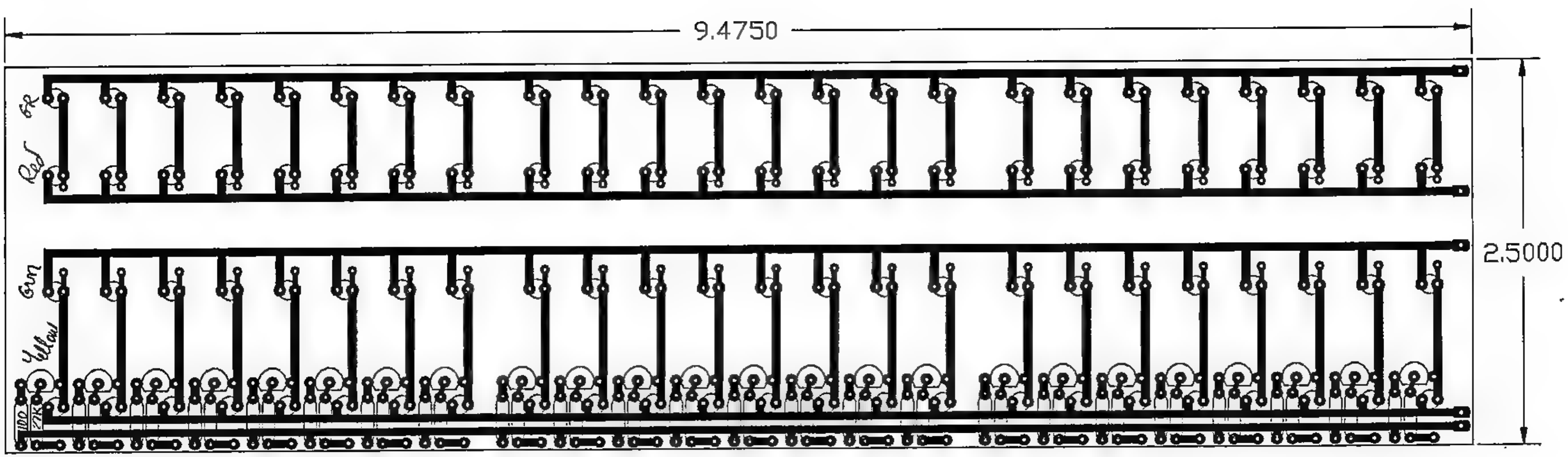

INCHES
QIIA120781

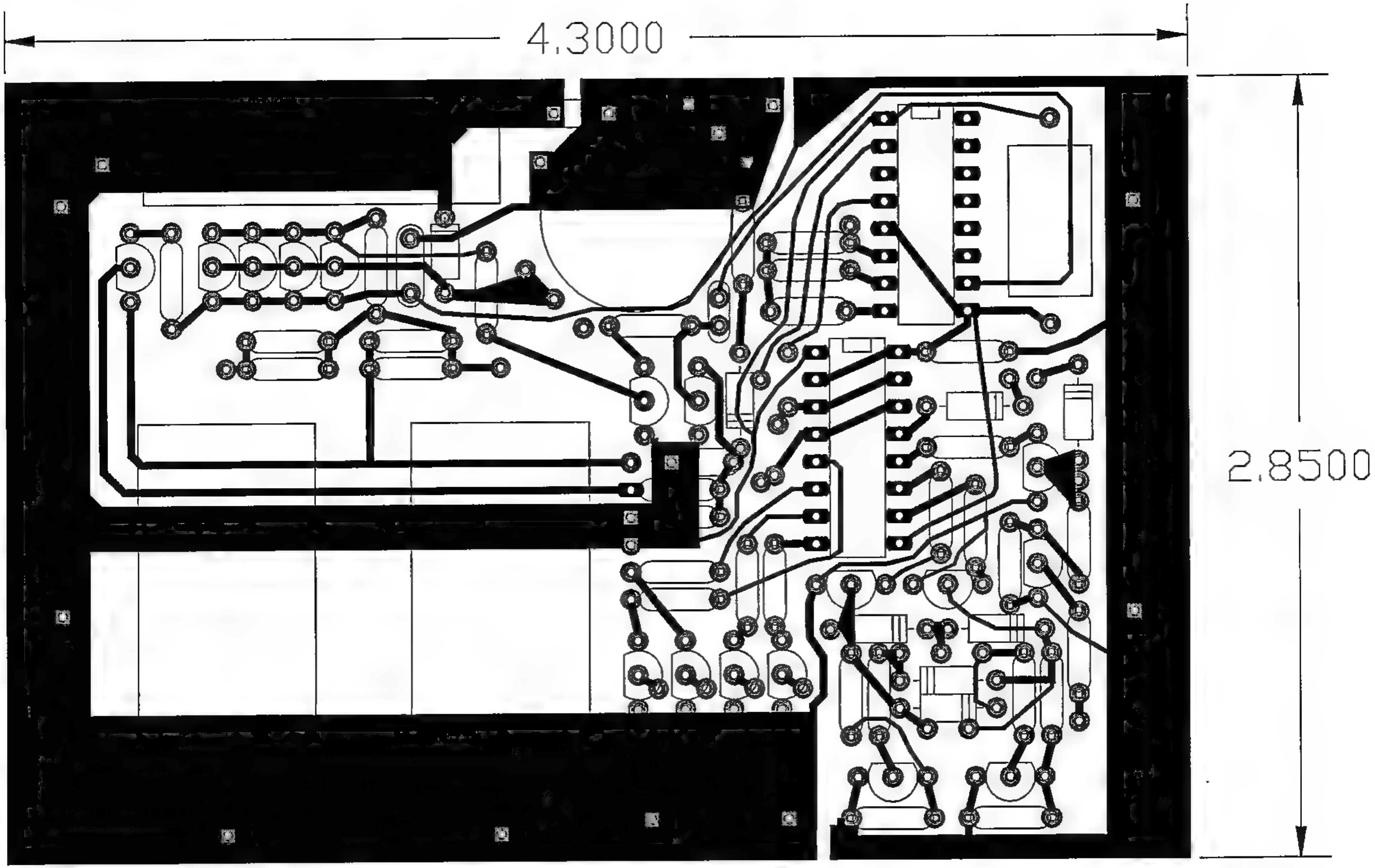


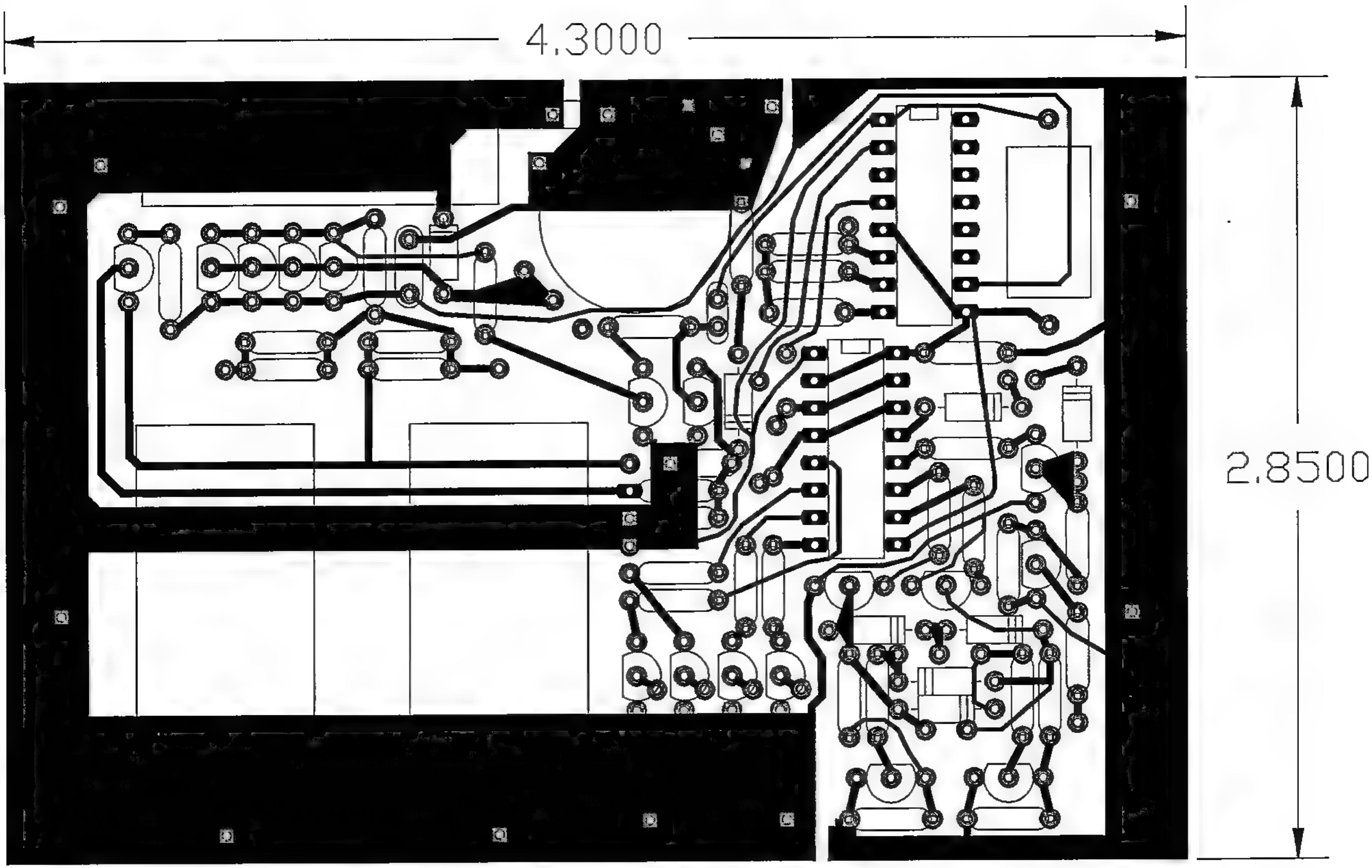

3.5875
1.9000
Z Y X W V U T S R P N M L K J H F E D C B A

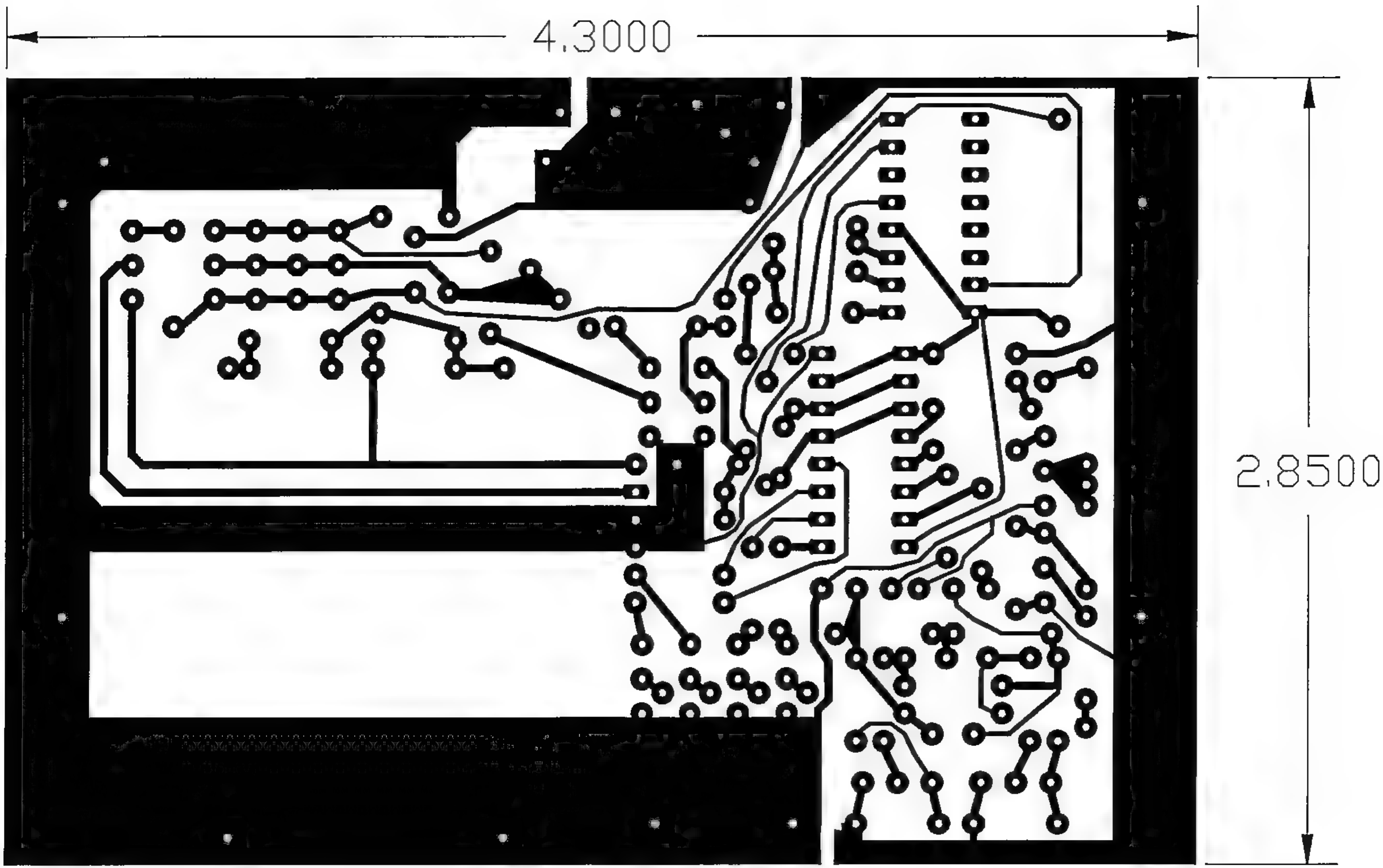

9.4750
2.5000

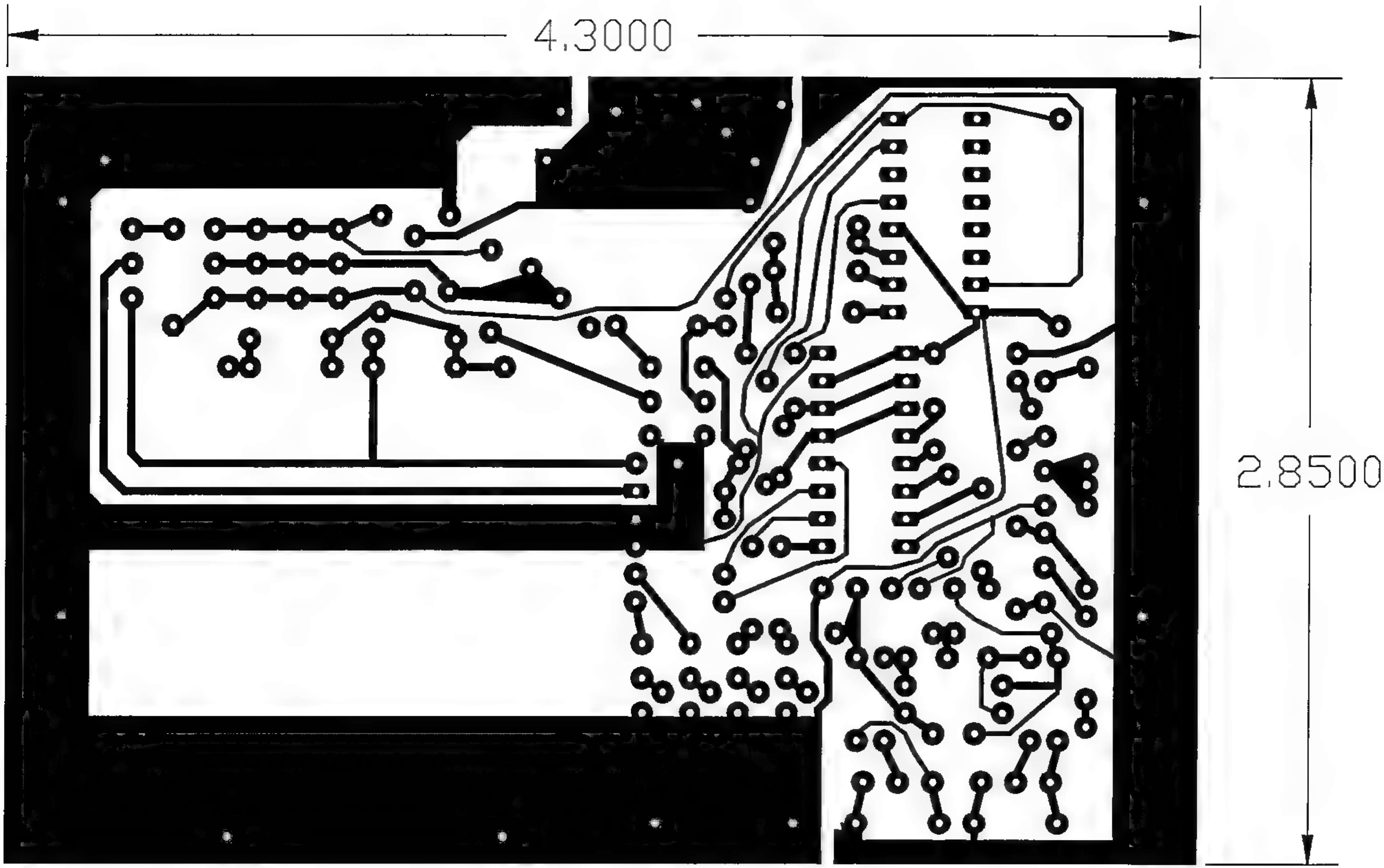
Q = MPS-A64



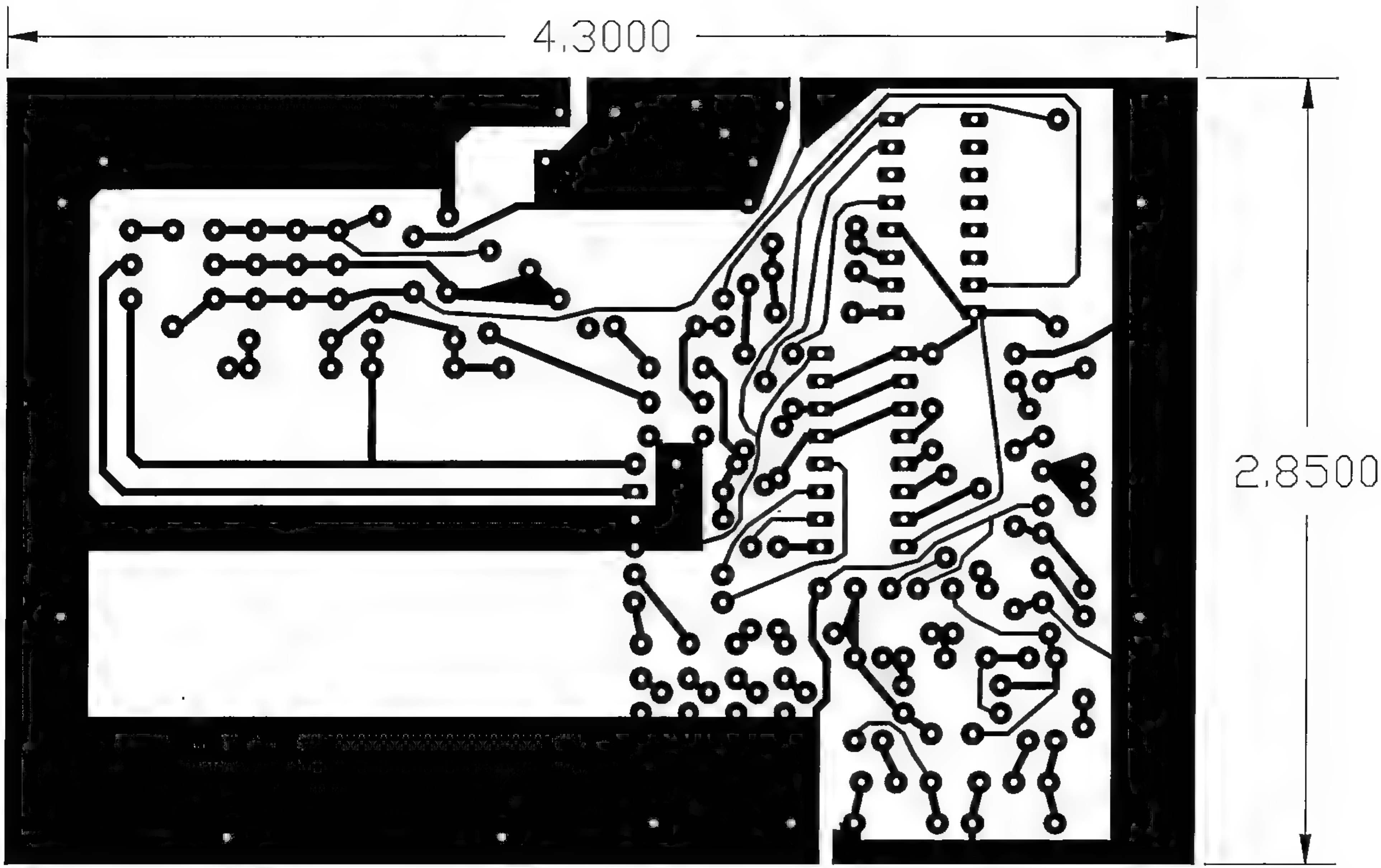

4.3000
2.8500


4.3000
2.8500


4.3000
2.8500

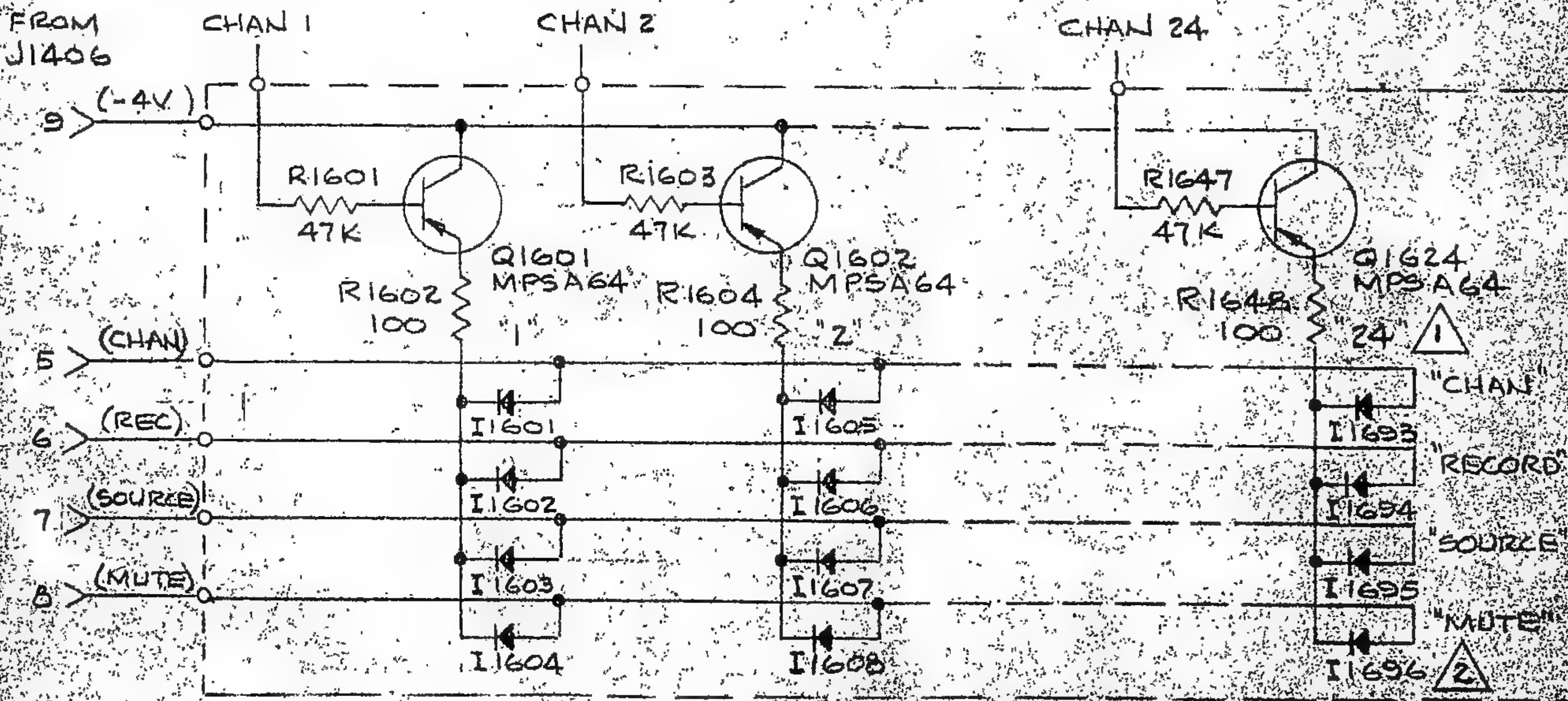


4.3000
2.8500



4.3000
2.8500

REVISIONS			
LTR	DESCRIPTION	DATE	BY



2 LED CARD UNIT SERIES CONTINUES INTO 1700'S FOR 32 & 40 TRACK.

1 24 TRK VERSION SHOWN. LAST NO. CORRESPONDS TO NO. OF TRACKS

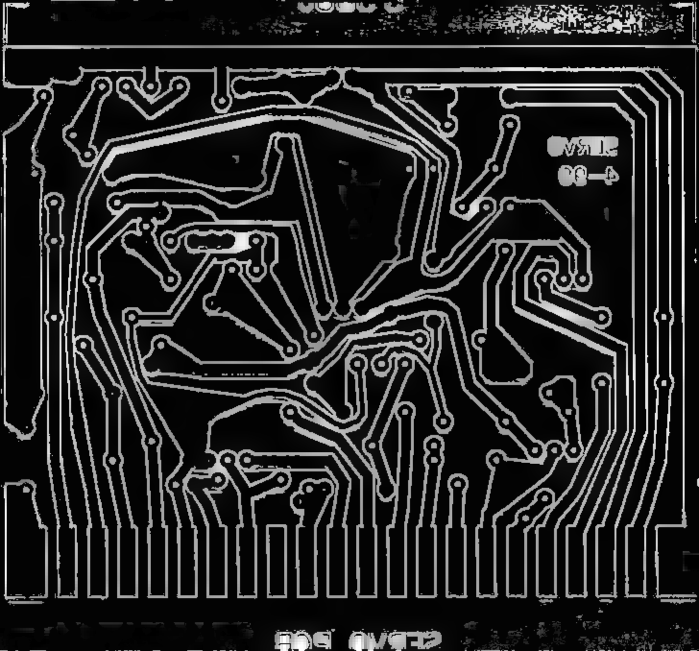
STEPHENS ELECTRONICS, INC.

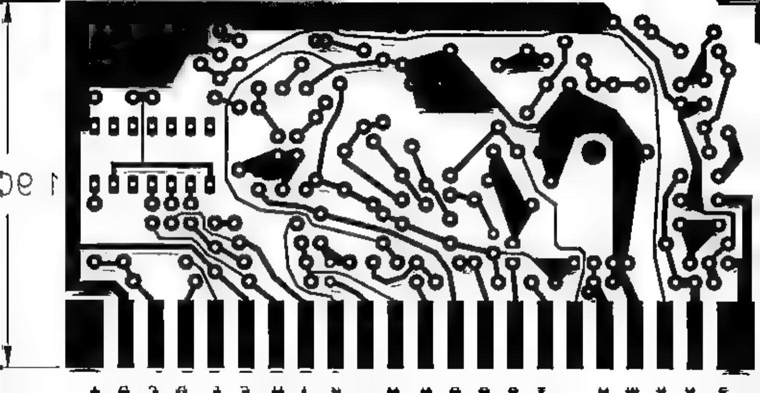
SCALE: —	APPROVED BY:	DRAWN BY: Geier
DATE: 22 OCT 73		REVISED

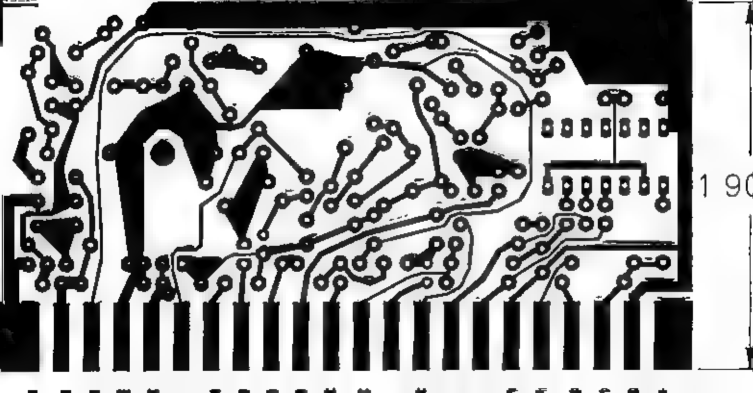
LED CARD

MODEL 821-B	FIGURE 6-14	DRAWING NUMBER SC1601

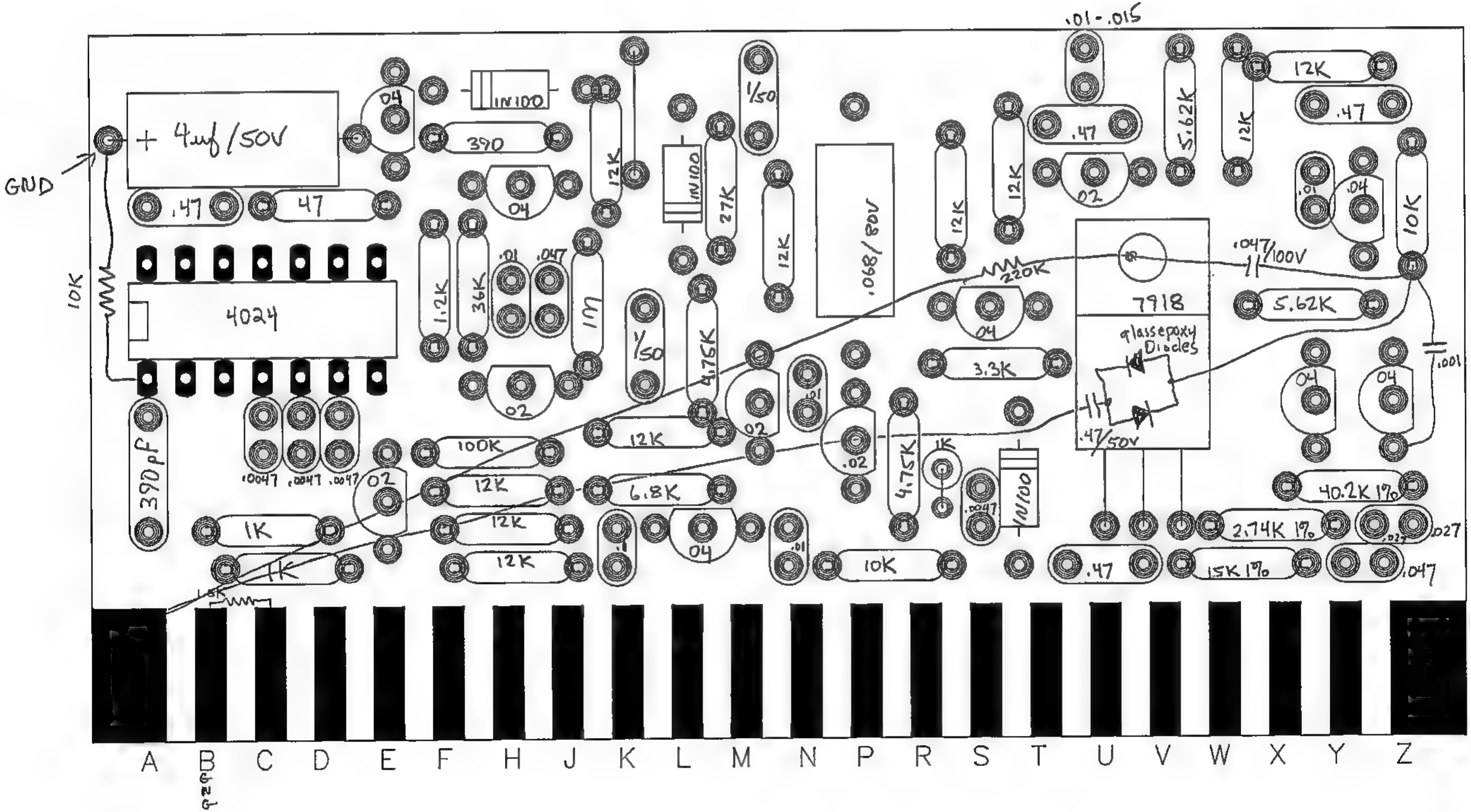
3 5880



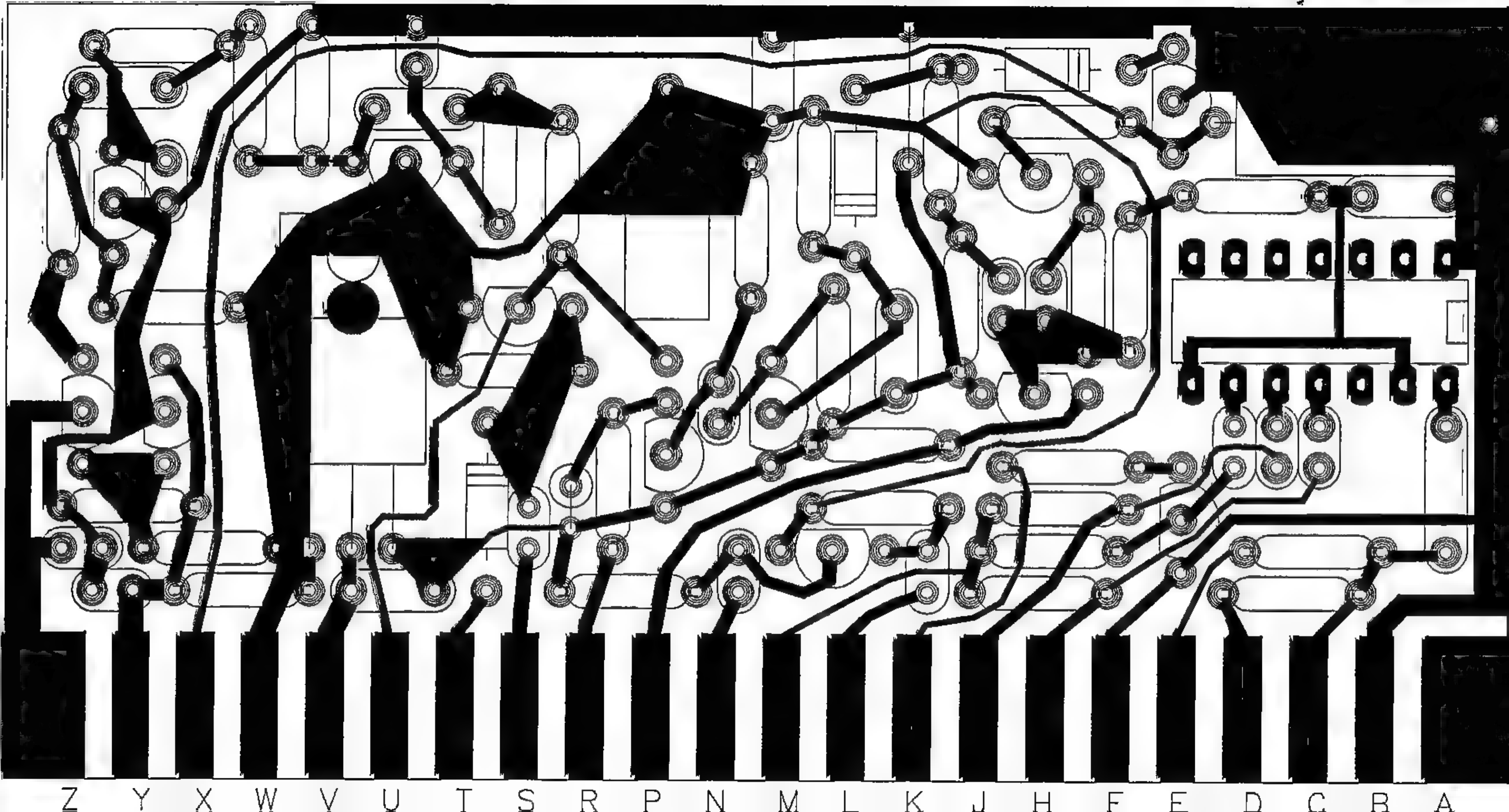



1 90

CONVERTER



.01-.015
+ 4uf/50V
GND
10K
.47
47
04
1N100
390
12K
1/50
27K
1N100
.068/80V
12K
12K
.47
02
5.62K
12K
12K
.47
.01
.04
10K
4024
1.2K
36K
.01
.047
1M
1/50
4.75K
220K
.047/100V
7918
5.62K
glassepoxy Diodes
3.3K
.001
04
04
02
.01
.02
.47/50V
100K
12K
02
390pF
.0047
.0047
.0047
02
12K
6.8K
4.75K
1K
.0047
1N100
40.2K 1%
1K
12K
04
.01
2.74K 1%
.027
.027
1K
12K
.1
10K
.47
15K 1%
.047
1.5K
A
B
C
D
E
F
H
J
K
L
M
N
P
R
S
T
U
V
W
X
Y
Z
GND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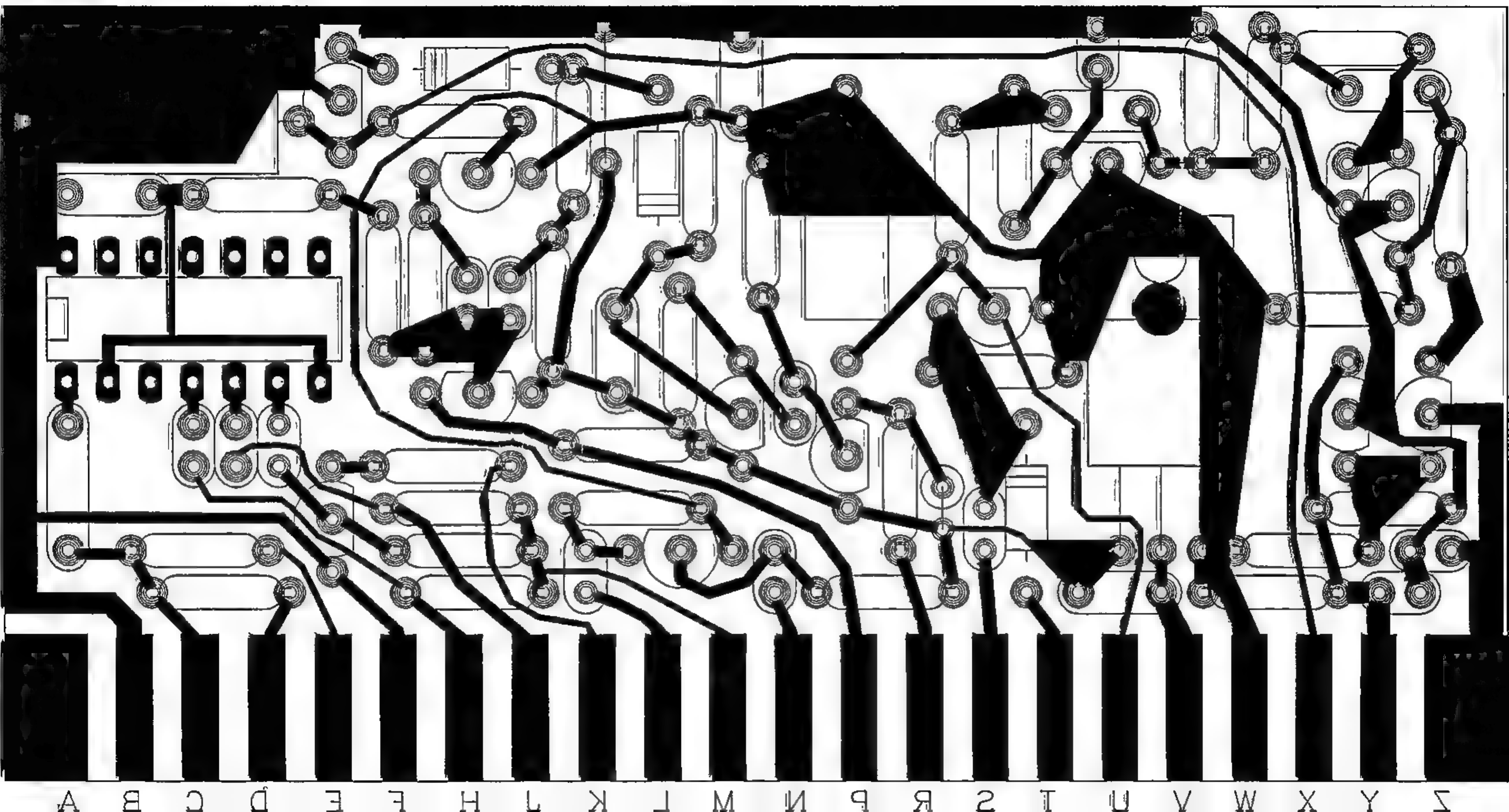
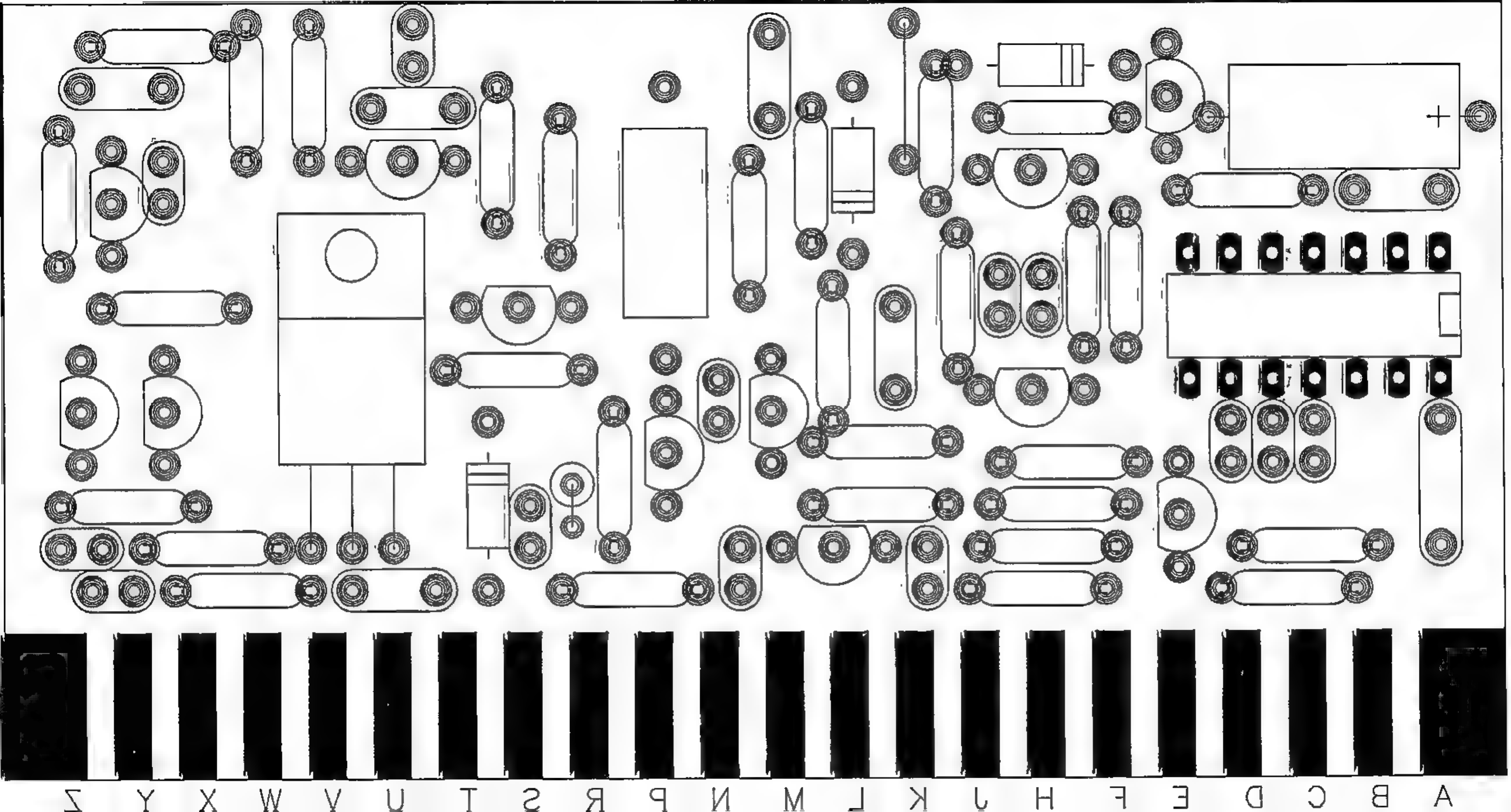

A B C D E F H J K L M N P R S T U V W X Y Z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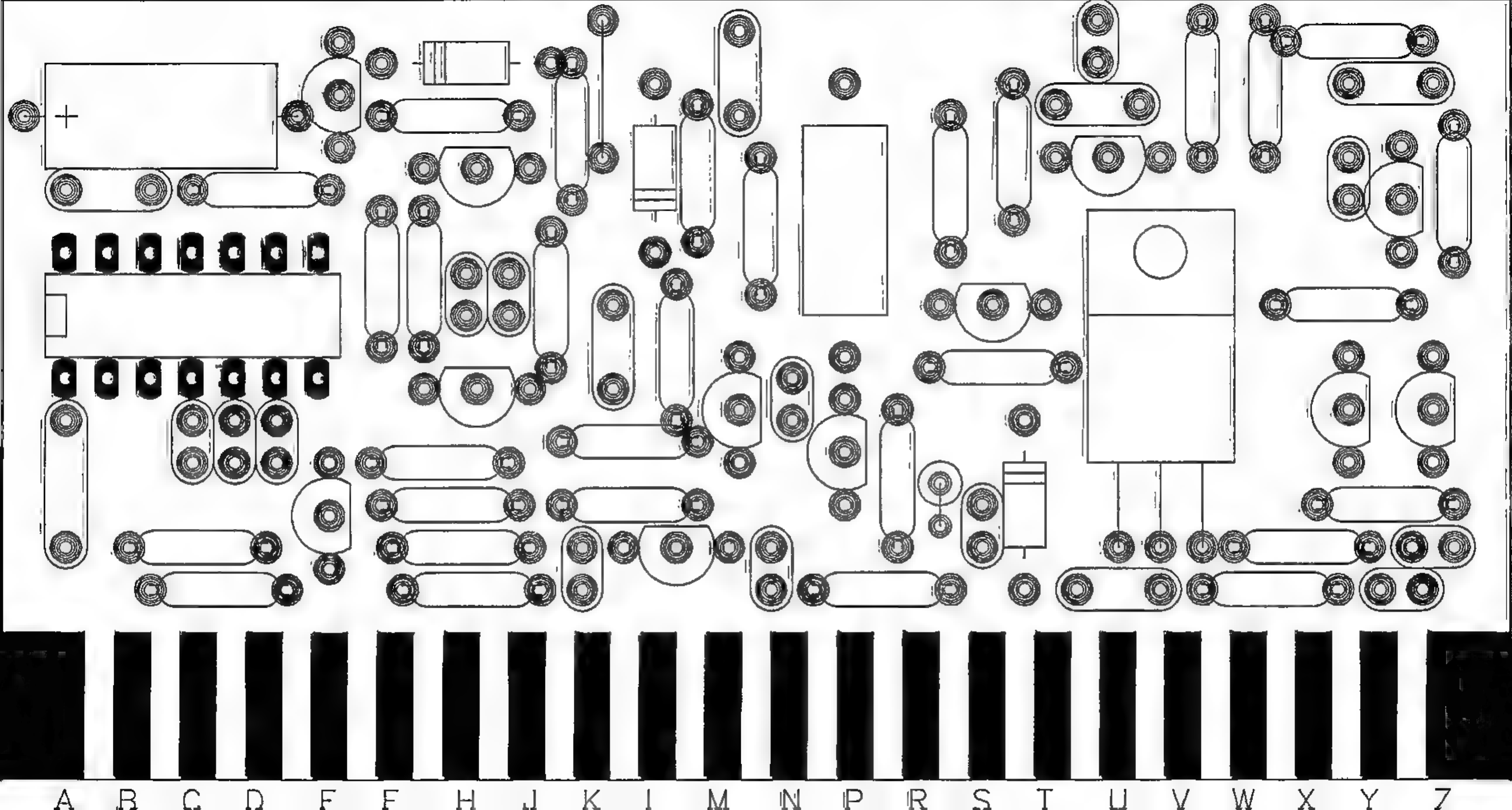

A B C D E F H J K L M N P R S T U V W X Y Z

CONVERTER

27'

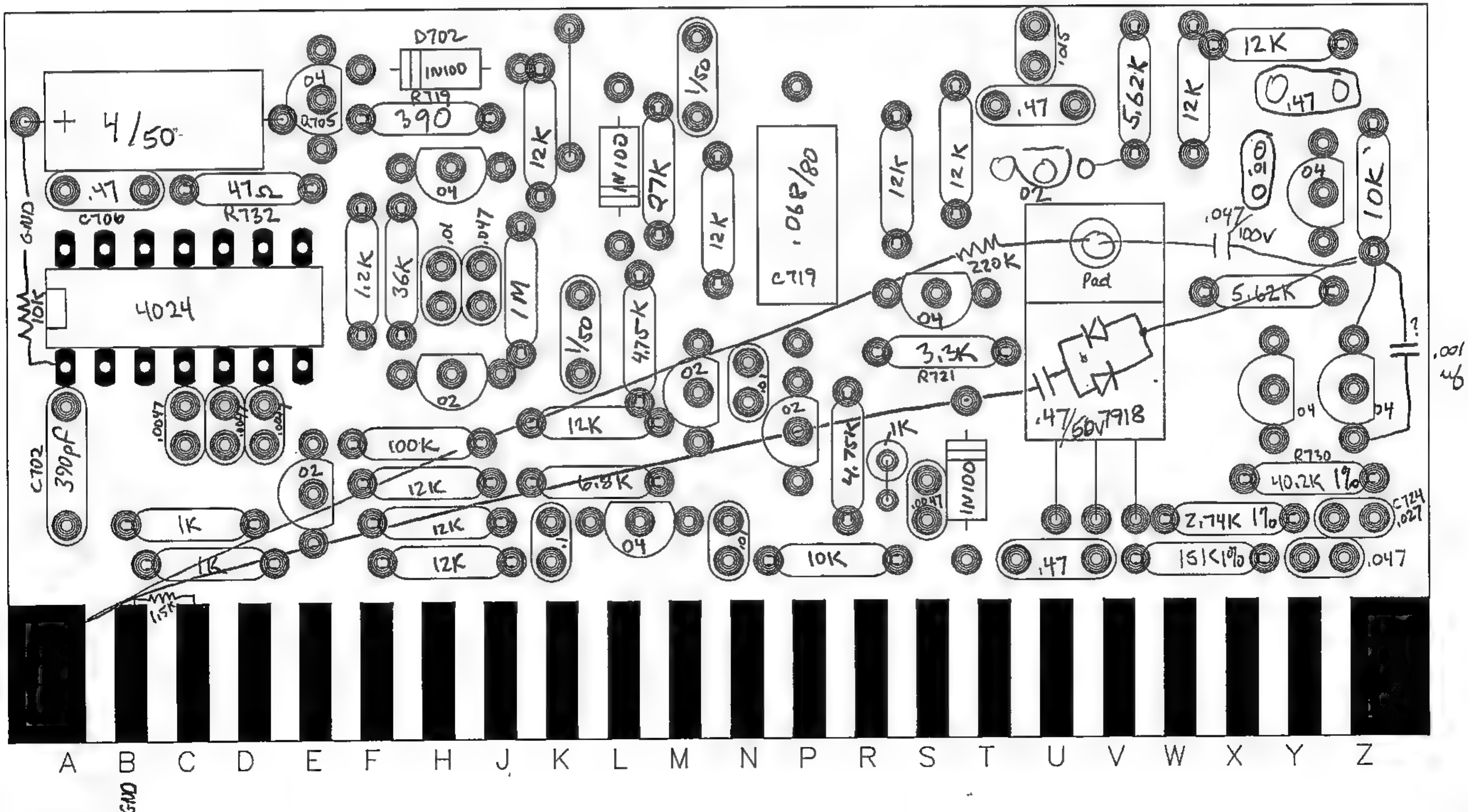
Back - 220K

6

1500

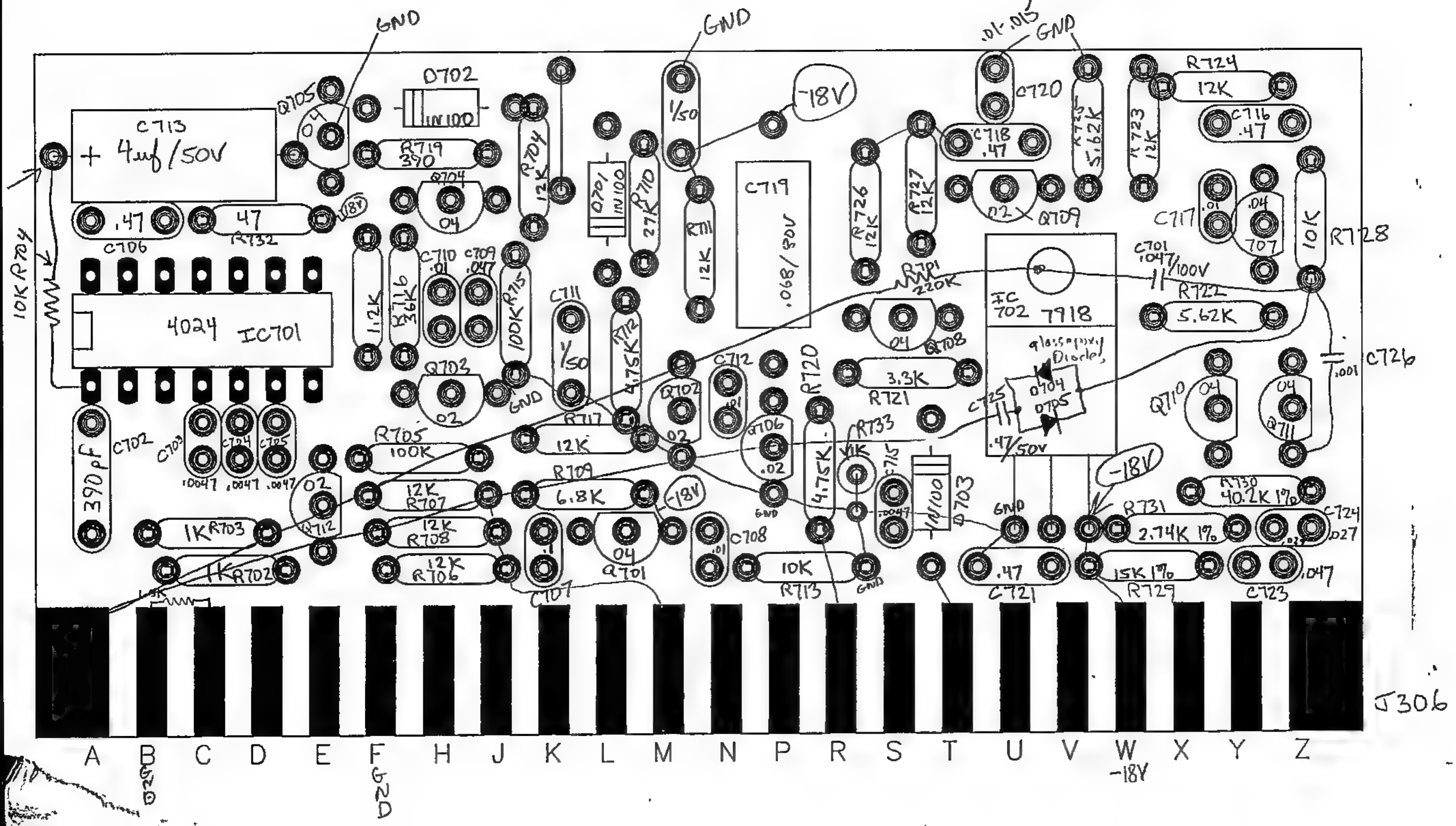
5.52D

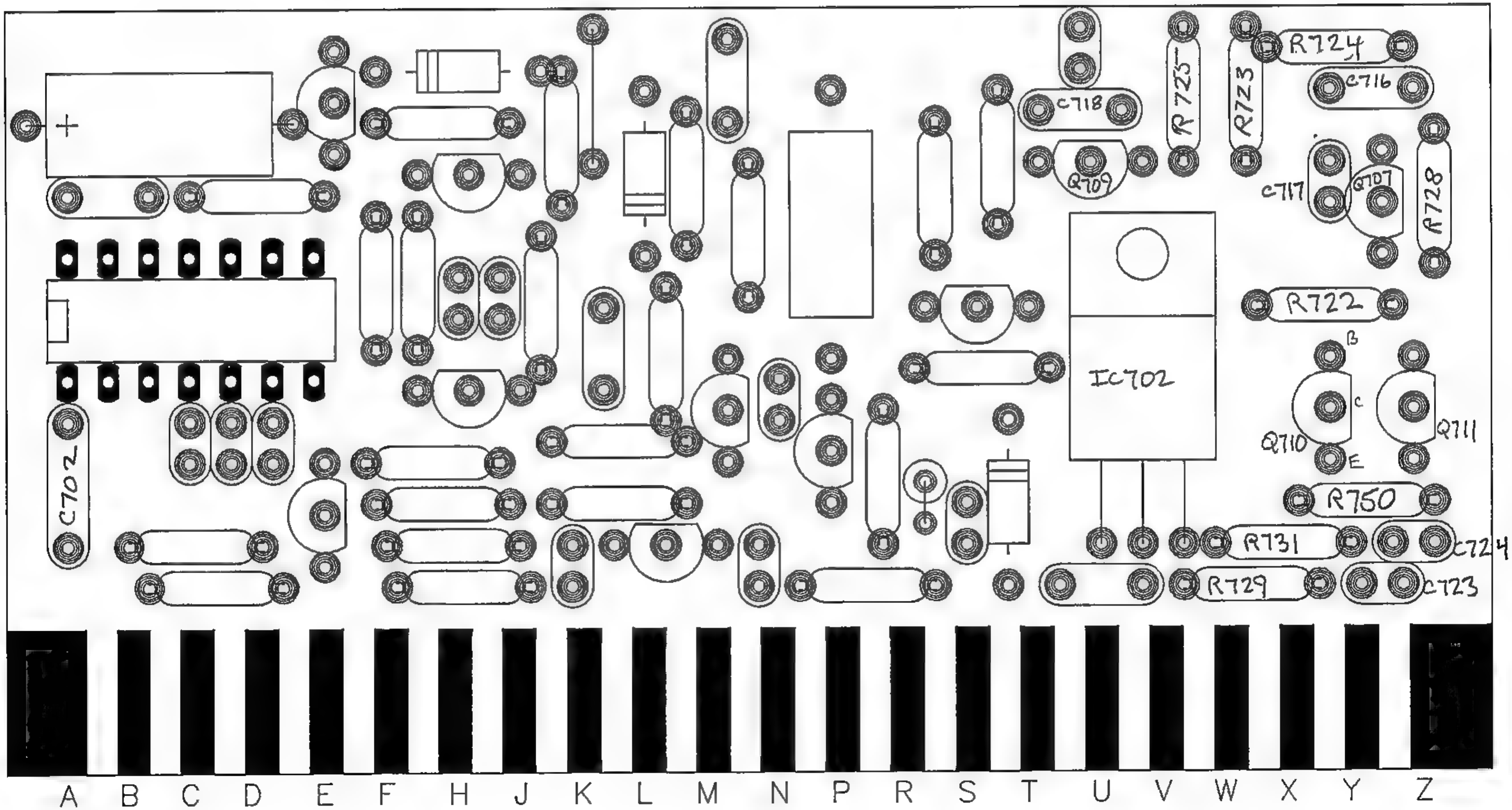
.0.04



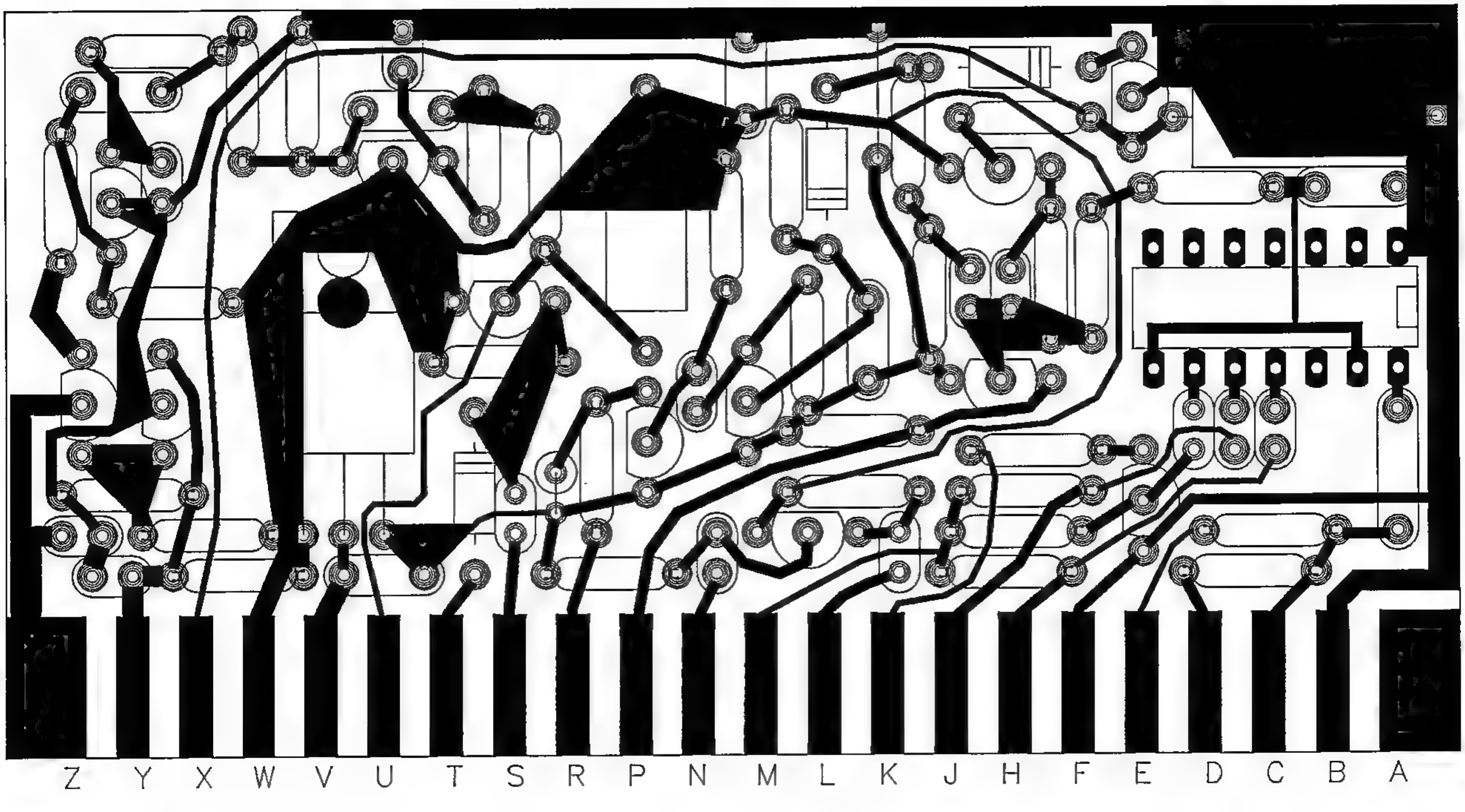
3704= NPN
3702= PNP

CONVERTER



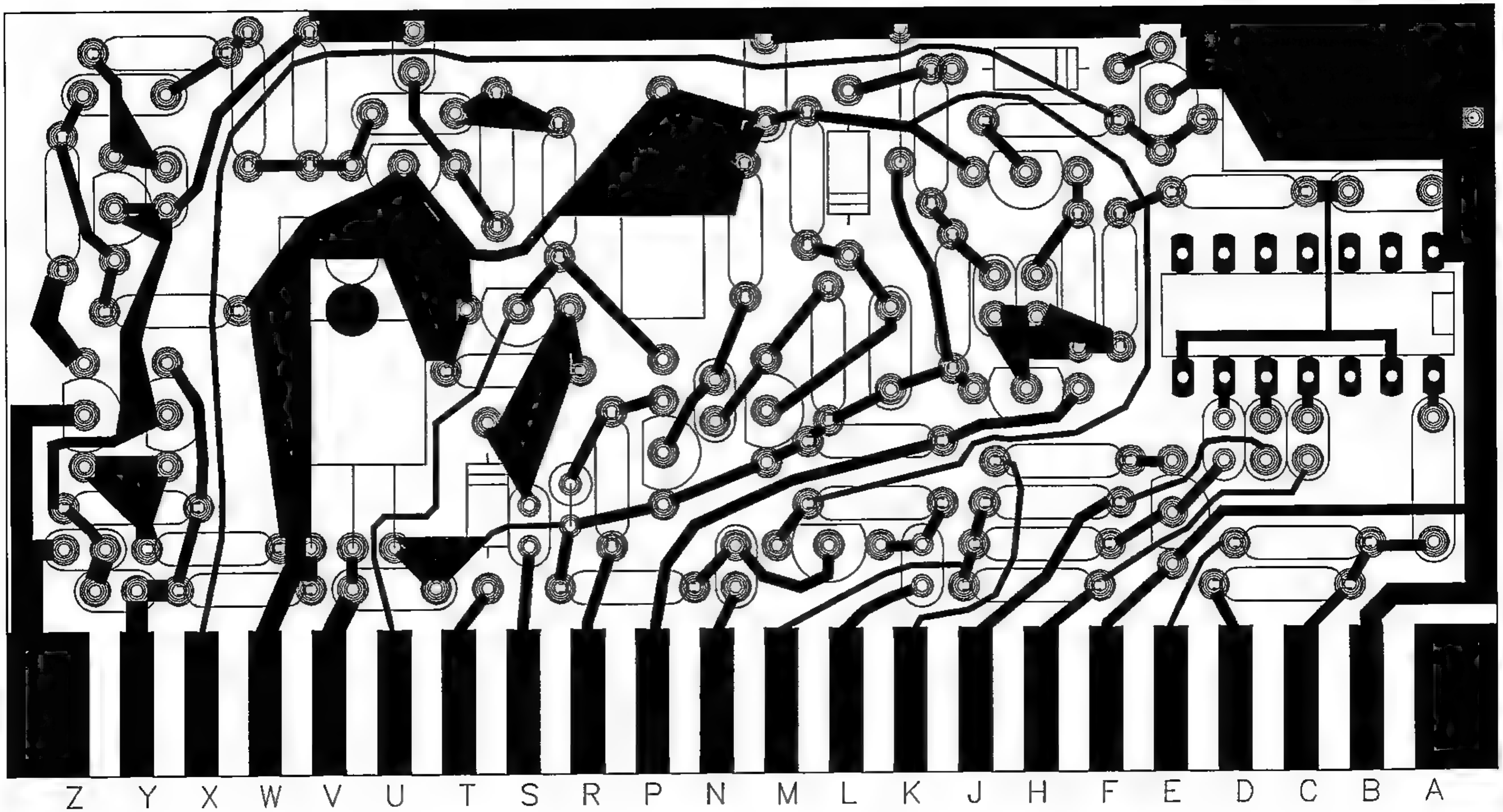


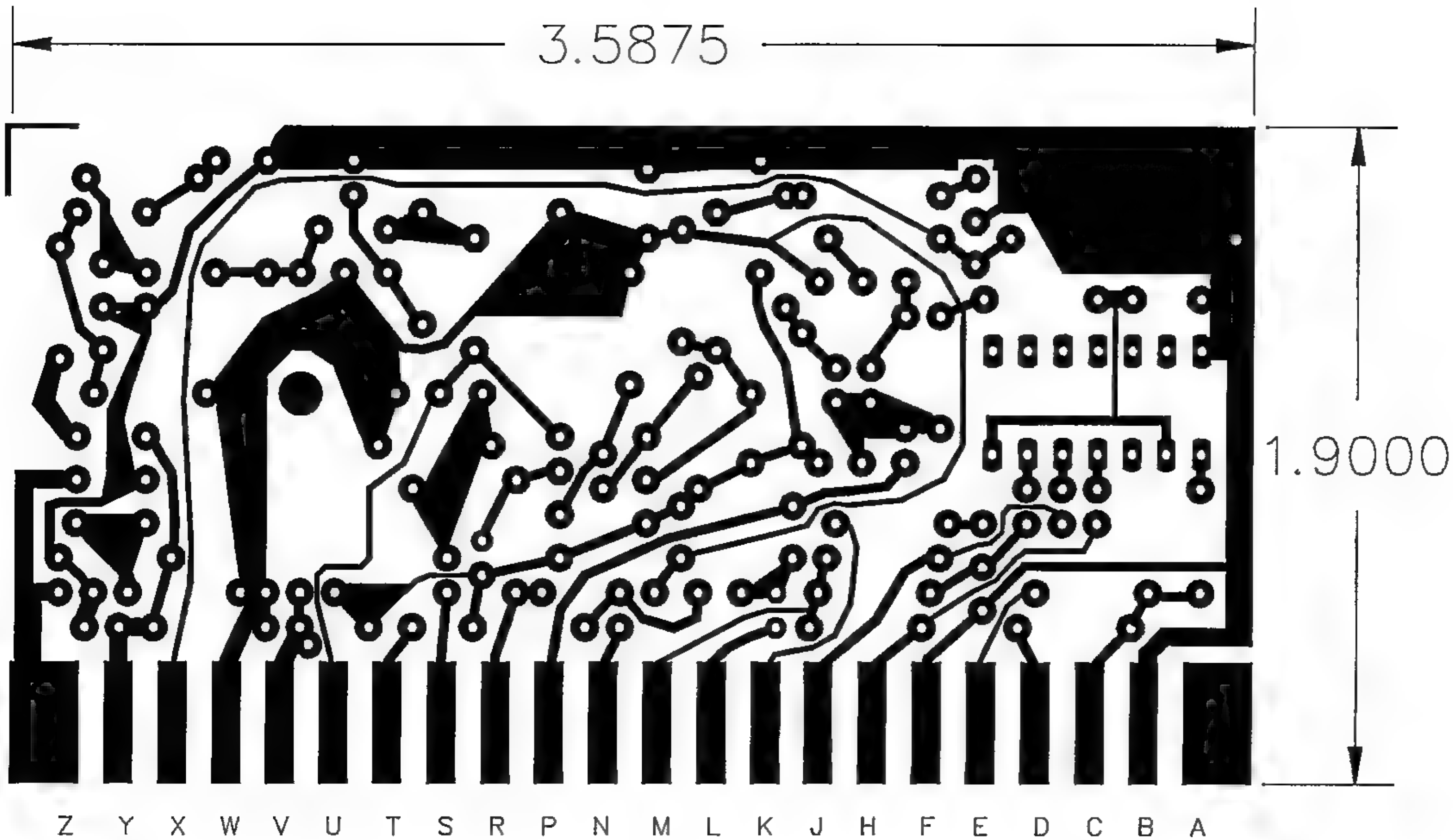
R724
C716
C718
R725
R723
Q709
C717
Q707
R728
R722
IC702
B
C
E
Q710
Q711
R750
R731
C724
R729
C723
C702
A B C D E F H J K L M N P R S T U V W X Y Z



Z Y X W V U T S R P N M L K J H F E D C B A

STEPHENS 812B
CONVERTER PCB
FILE : ST_CONV
4-1-90





3.5875
1.9000
Z Y X W V U T S R P N M L K J H F E D C B A

Matched Emitter/Detector Pair

STED 3000

Description

The STED 3000 is an optically and mechanically matched pair consisting of a gallium arsenide, infrared LED and an NPN silicon, planar phototransistor. The individual component packages are color coded for easy identification. Red designates the phototransistor, and black the LED.

Features

- Side looker package
- Optically and mechanically matched
- Durable, low cost plastic housing

Applications

- [illegible]
- Acceleration, location sensing
- Low cost object detection

Electrical and Optical Specifications

Absolute Maximum Ratings at Ta = 25°C

Emitter Detector Pair

[illegible]

LED

[illegible]

Phototransistor

[illegible]

Individual Electro-Optical Characteristics

LED

[illegible]

Sensor

[illegible]

Coupled Characteristics

[illegible]

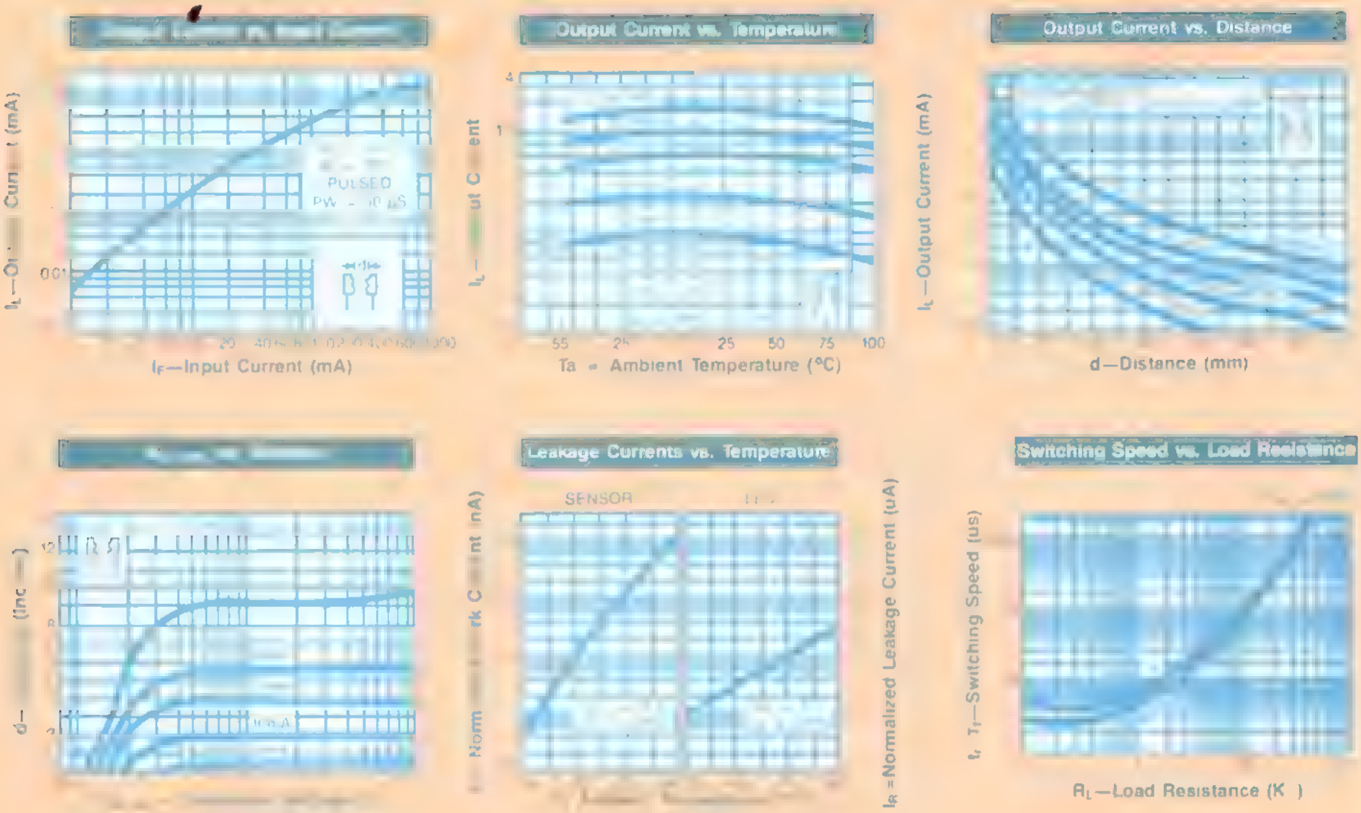
Switching Speeds

[illegible]

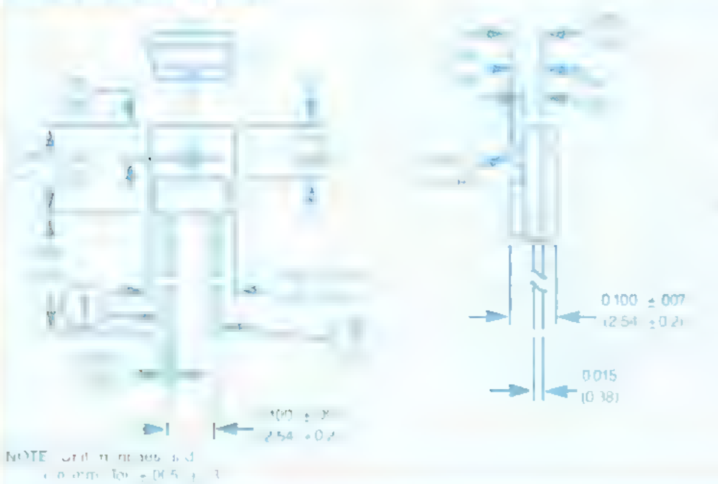
NOTE:
[illegible] with lenses of emitter and detector on a common axis within .004" and parallel within 5°. No stray irradiation is allowed.

SENSOR TECHNOLOGY

STED 3000 Typical Characteristics



Mechanical Data



SCHEMATIC

PIN	LED	SENSOR
1	CATHODE	EMITTER
2	ANODE	COLLECTOR

Sensor Technology is a leading producer of optoelectronic components, encoders and a wide ...iety of semi-custom optoelectronic assemblies. ...nsor Technology's in-depth electronic and electromechanical engineering support staff helps customers take their products from prototype development through high-volume production.

Sensor Technology has developed a nationwide network of experienced manufacturer's representatives – each attuned to understanding your application and selecting the Sensor Technology device that will best do the job for you. Contact our factory for the representative nearest you.

SENSOR TECHNOLOGY
A Division of ILC Technology
2832 Chadron Ave./Hawthorne, CA 90250/(213) 978-1150
FAX 213-978-1230 TWX 910-494-4776

MJ

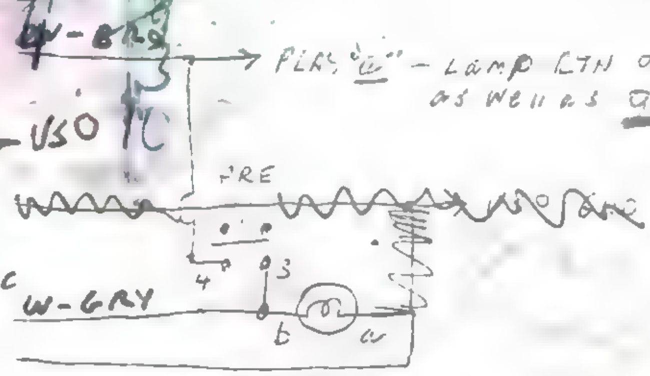
CONNECTOR - JC - 50 PIN

5207
46/C CABLE
#24-7/32 TC .004 S.R. PVC
80 C 300V AWM
.063 PVC JACKET

	CABLE COLOR TC REMOTE	JC
RW a	BRO	1
L a	RED	2
P b	ORG	3
ST 2	YEL	4
ST a	GRN	5
ST 1	BLU	6
L 1	VIO	7
RW 2	GRY	8
F a	WHT	9
RC a	BLK	10
TV. Fa	WHT-BRO	11
TV. VSO	WHT-RD	12
SV SN RLM.	WHT-ORG	13
SO	WHT-YEL	14
GND	WHT-GRN	15
~~ND SP~~	WHT-BLU TC	16
T SP	WHT-VIO	17 NC
LT 43	WHT-GRY	18
O	WHT-BLK-BRO	19
OUT	WHT-BLK	20
	WHT-RD-BRO	21 NC
IN	WHT-BLK-RD	22
PS.	WHT-RD-ORG	23
MP. IN	WHT-RD-YEL	24
DISP STICK 3	WHT-RD-GRN	25 — DISPLAY STICK
SPEED SW.	WHT-RD-BLU	26 NC
DISP STICK 1	WHT-RD-VIO	27 — DISPLAY STICK
Fg. s. 3	WHT-RD-GRY	28
7 3	WHT-BLK-BRN	29
8 3	WHT-ORG-BLK	30
3	WHT-ORG-BRN	31
STORE 0	WHT-BLK-BLU	32
STORE 0	WHT-BLK-VIO	33
g. sel 6	WHT-ORG-YEL	34
START 6	WHT-ORG-GRN	35
A1	WHT-ORG-BLU	36
A8	WHT-ORG-VIO	37
B8	WHT-ORG-GRY	38
B7	WHT-BLK-GRY	39
B2	WHT-BLK-YEL	40
B3	WHT-BRO-YEL	41
A2	WHT-BRO-GRN	42
B1	WHT-BRO-BLU	43
3 Fg. S. 4	WHT-BRO-VIO	44
6, Fg. S. 4	WHT-YEL-GRN	45
9, Fg. sel 4	WHT-YEL-BLU	46
START 4	WHT-YEL-VIO	47
MB 4	WHT-BRO-GRY	48
	~~WHT-...~~	NC to GND
	~~WHT-...~~	NC to GND

Display Stick (36–43): DISPLAY STICK

NOTE! 9 II LIGHTS RETURN TO -27 VOLTS

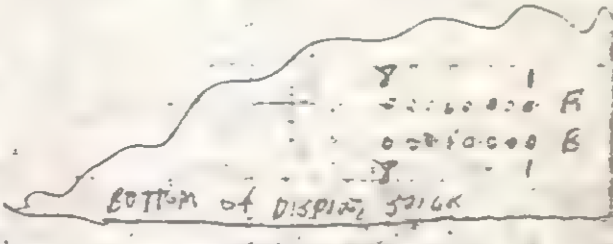


PINS "a" - LAMP RTN ON SHUTTLE CONTROLS AS WELL AS 9II LIGHTS.

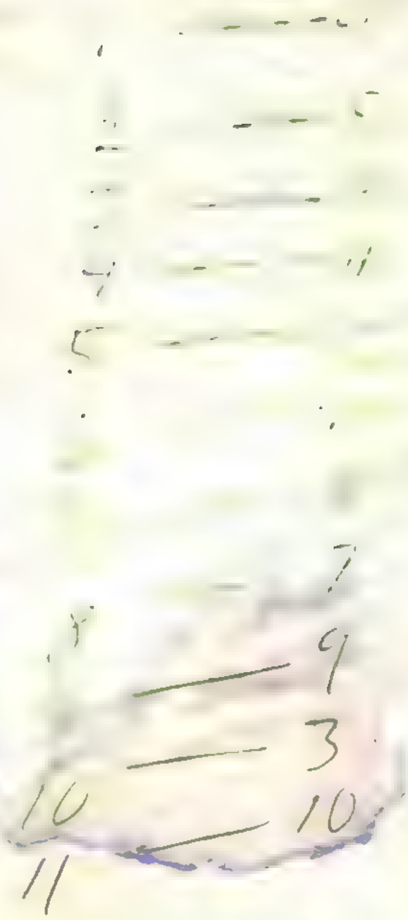
IF JC ... CABLE - CLIP SHORT THE FOLLOWING

WHI - BLU - GRY
WHI - BLU - GRN
WHI - BLU - VIO
WHI - GRN - VIO
WHI - GRN - GRY
WHI - GRY - YELL
WHI - GRY - VIO
WHI - BLK - BRO - ORG
WHI - BLK - BRO - YELL
WHI - BLK - BRO - BLU
WHI - BLK - BRO - RD
WHI - BLK - BRO - GRN

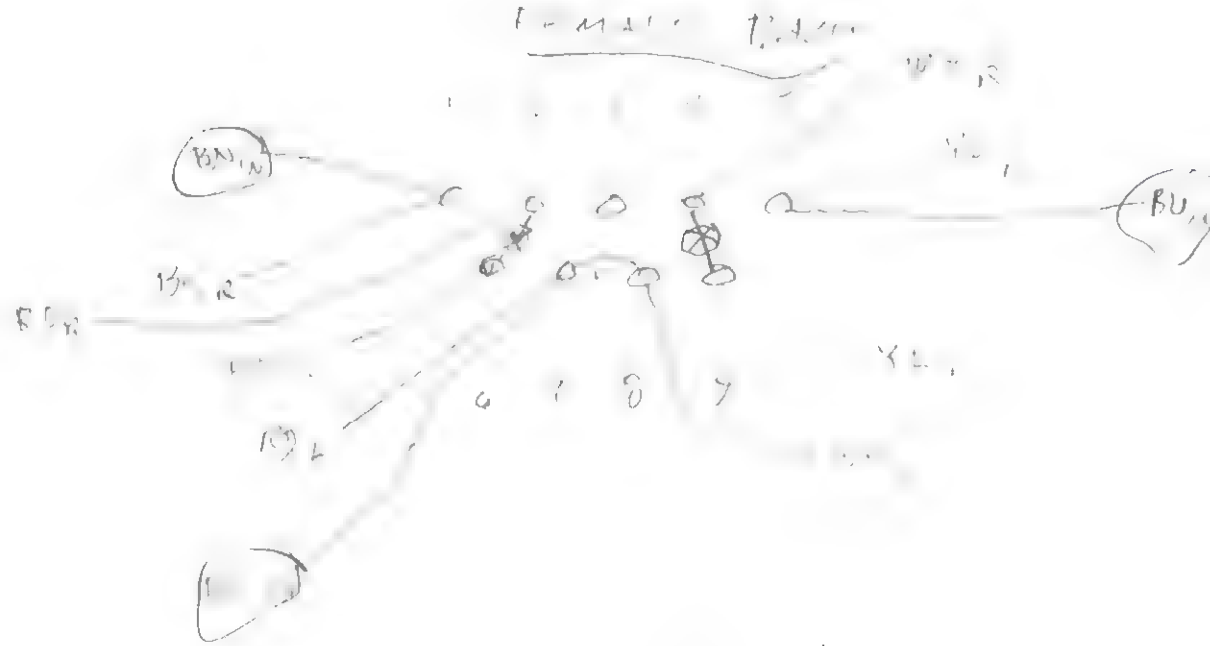
Pins
17 - nc
20 + 22 tie together
21 - nc
23 + 24 tie together
26 - nc



BOTTOM of DISPLAY STICK


4
5
7
9
3
10
10
11

VROOM



AUTO NET SERVICES
19740 OXNARD STREET SUITE 306
TARZANA, CALIFORNIA 91356
TELEPHONE 818·708 8788
FAX 818·708 6845

TKS 3 & 4 NO RCD —

TK 14

TKS 21, 22, 23, 24 NO ERASE OR RCD.

C – SENSOR DIRECT

D – STROBE

E – STROBE

M – STROBE

P – STROBE

R – OSC.

S – STROBE 1H f

λ – 60 HZ(?) STROBE

Y – 17VDC

X – 3.75 VDC

W – 26 VDC

V – 26 VDC

U – 24VDC

T – 22VDC

R – 5.25VDC

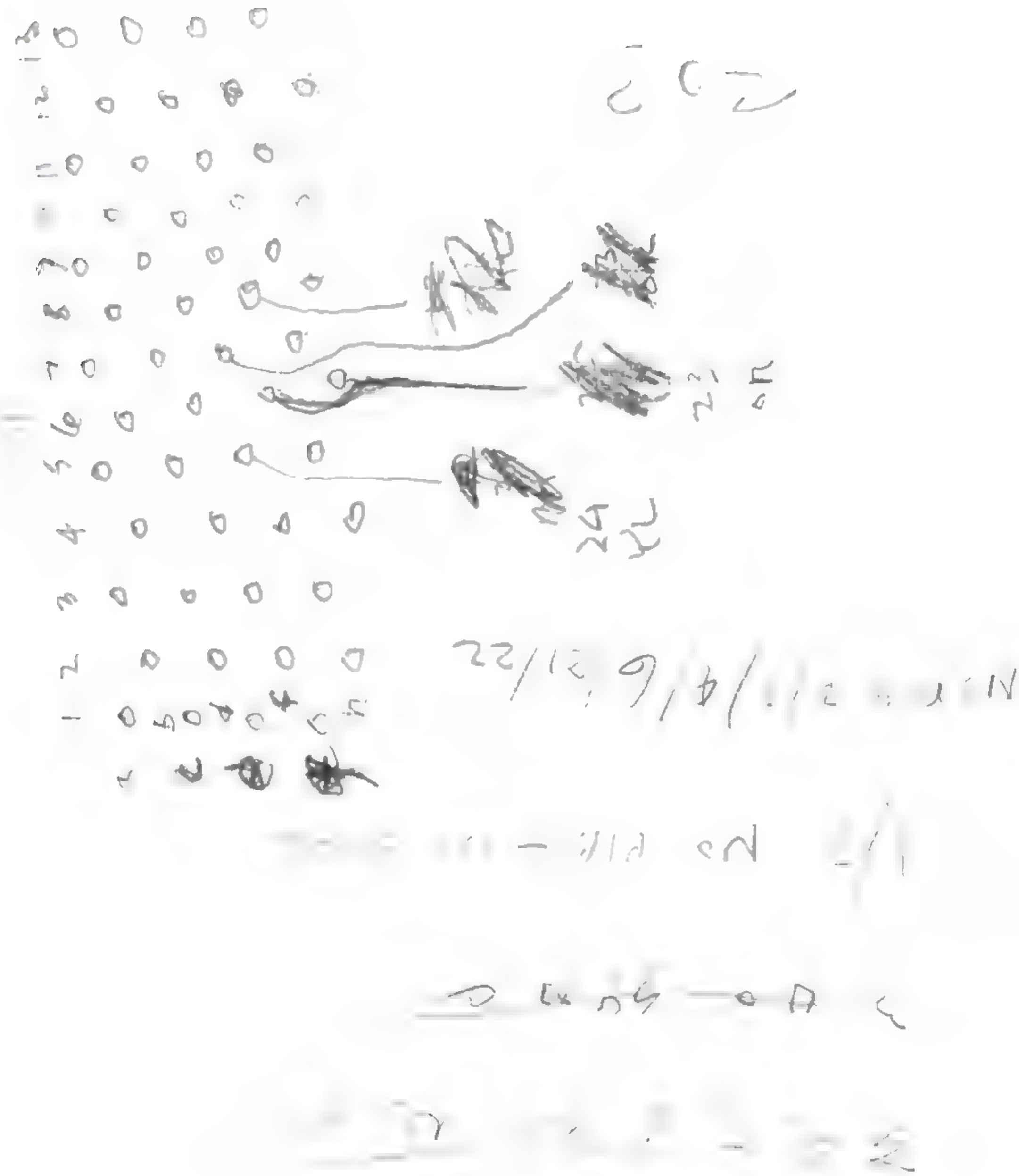
C – 21VDC

A – 2.25VDC

L

D

VROOM



AUTO NET SERVICES
18740 OXNARD STREET SUITE 305
TARZANA, CALIFORNIA 91356
TELEPHONE 818·708 8788
FAX 818·708 8646

PB #1 & #7 DEAD

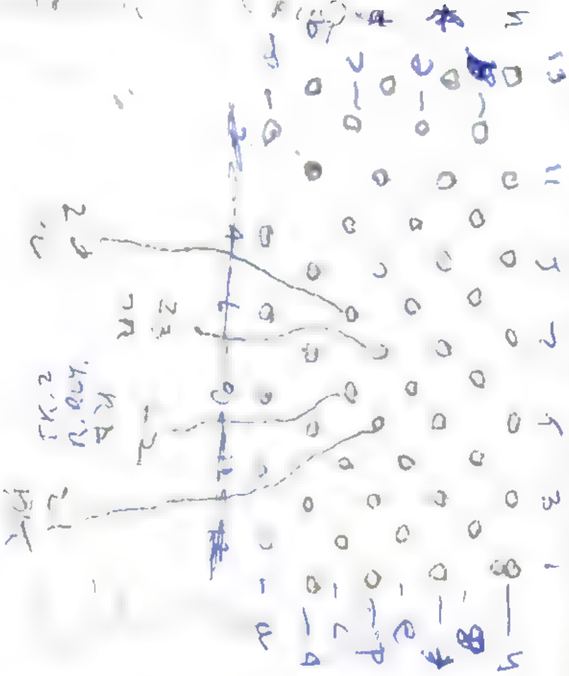
4 —

NEED RELAYS

TEST TAPE FULL TRACK

GOOD DEGAUSSER

NEED - AMPHENOL PIN [illegible] & [illegible]



PRE AMP DIODE

1N100

GERMANIUM DIODE

NOT SILICON DIFFERENT

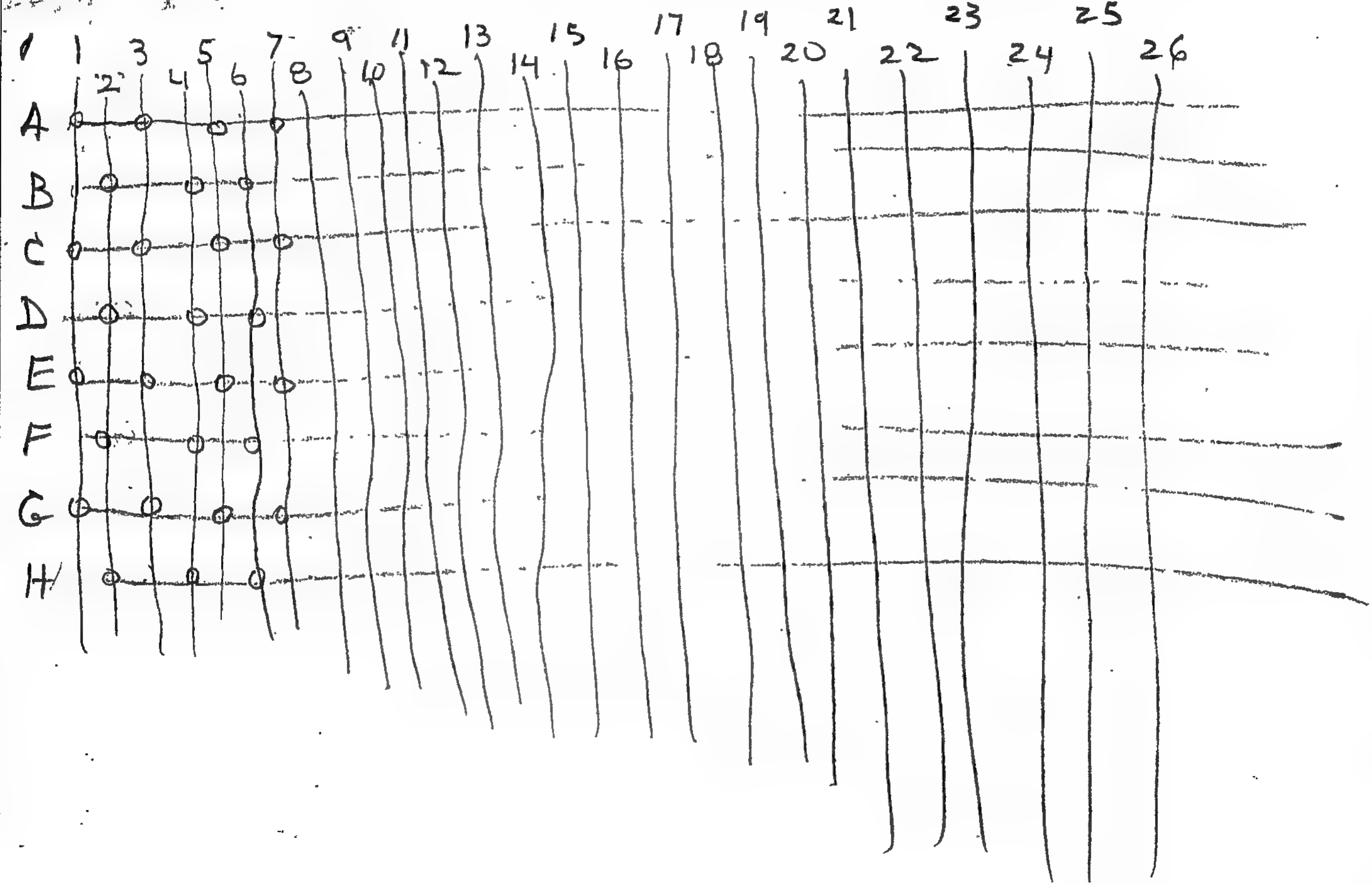
ACROSS THE JUNCTION —

6 ½ HR.

TK. 16 - NO BIAS ADJ.

TK. 22 - DEAD

TK. 24 - NO BIAS ADJ.


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
A
B
C
D
E
F
G
H

3-15-74

Stephens 821A-24 Electronics

Sync Panel Input-Output Connector

(Amphenol 57-40500 Chassis)
(Amphenol 57-30500 Cable)

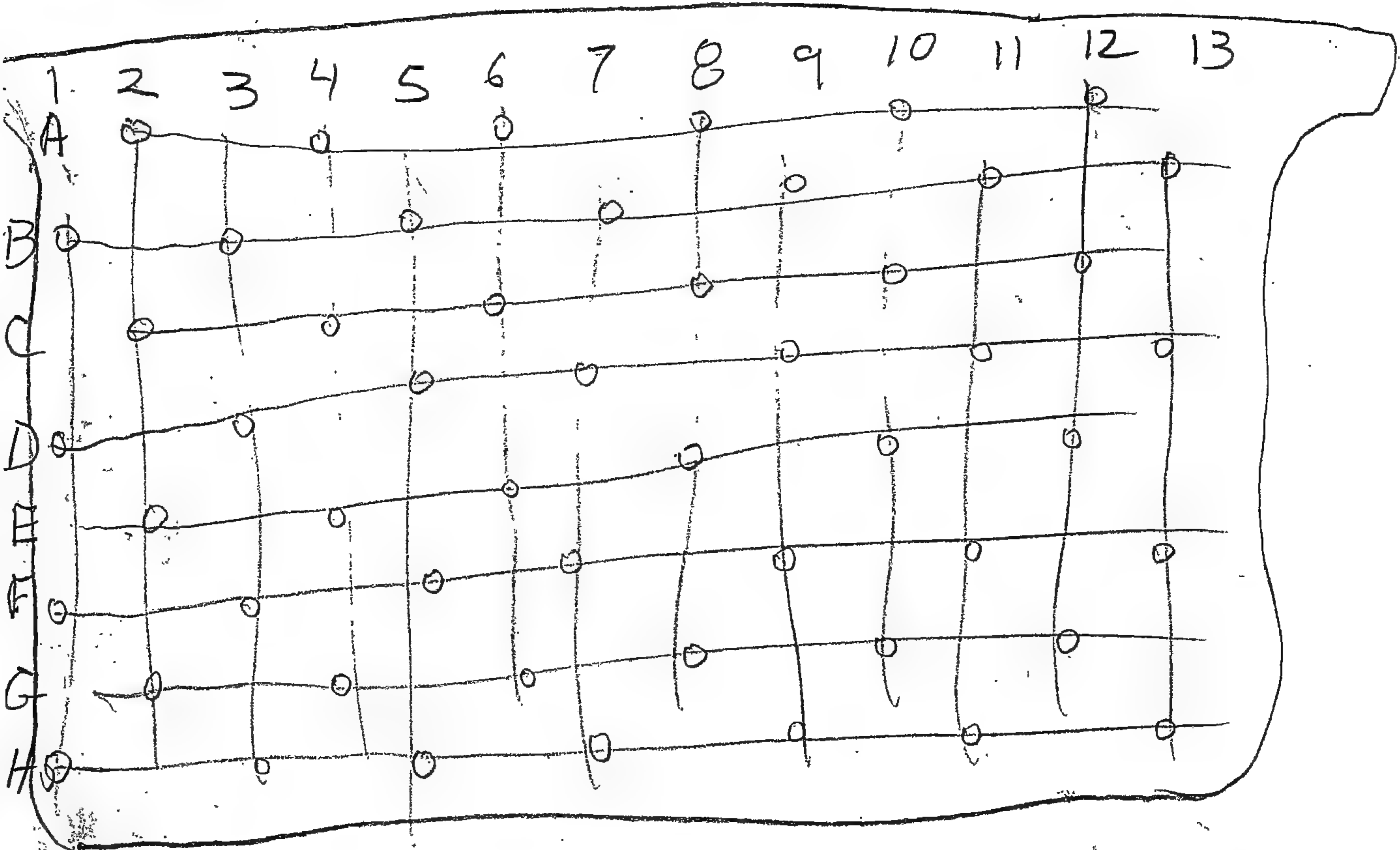
CONNECTOR 1

Pin	Connection	
1-12	Playback-Out Hot	(1=Channel 1)
13-24	Record In Hot	(13=Channel 1)
26-37	Dolby Controls	(26=Channel 1)
38	Record Signal	
39-50	Grounds	

CONNECTOR 2

Pin	Connection	
1-12	Playback-Out Hot	(1=Channel 13)
13-24	Record In Hot	(13=Channel 13)
26-37	Dolby Controls	(26=Channel 13)
38	Record Signal	
39-50	Grounds	

Rear View Stephens SU - Connectors



...d	2			D 3				
...ange	3			F 3				
...ellow	4			H 3				32
...reen	5			A 4				32
...Blue	6			C 4				32
...ue	7			E 4				32
...own	8			G 4				32
...hite	9			B 5				32
...ack	10			D 5				32
...Brown	11			F 5				32
Red	12			A 6				32
...range	13			C 6				32
...ellow	14			E 6				32
...reen	15			G 6				32
Blue	16			D 7				
...olet	17	W						24
...olet	18	W						
...ink	20	L			3rd			26
...rown	21						10	27
...Red	22		Y					27
...ange	23		X					27
Black	24	U			3rd			25
...hite	25		E					24
...lack	26				9th			27
...reen	27							
...d	28							
...ue	29							

CONNECTOR - JC - 50 PIN 11-16-77

CABLE CONN TO REMOTE	JC
BRO	1
RED	2
ORN	3
YEL	4
GRN	5
BLU	6
VIO	7
GRY	8
WHI	9
BLK	10
WHI-BRO	11
WHI-RD	12
WHI-ORN	13
WHI-YEL	14
WHI-GRN	15
WHI-BLU	16
WHI-VIO	17
WHI-GRY	18
WHI-BLK-BRO	19
WHI-BLK	20
WHI-RD-BRO	21
WHI-BLK-RD	22
WHI-RD-ORN	23
WHI-RD-YEL	24
WHI-RD-GRN	25
WHI-RD-BLU	26
WHI-RD-VIO	27
WHI-RD-GRY	28
WHI-BLK-GRN	29
WHI-ORN-BLK	30
WHI-ORN-BRN	31
WHI-BLK-BLU	32
WHI-BLK-VIO	33
WHI-ORN-YEL	34
WHI-ORN-GRN	35
WHI-ORN-BLU	36
WHI-ORN-VIO	37
WHI-ORN-GRY	38
WHI-BLK-GRY	39
WHI-BLK-YEL	40
WHI-BRO-YEL	41
WHI-BRO-GRN	42
WHI-BRO-BLU	43
WHI-BRO-VIO	44
WHI-YEL-GRN	45
WHI-YEL-BLU	46
WHI-YEL-VIO	47
WHI-BRO-GRY	48
	49
	50

RSC code for
one-way snake

1	BRN/WHT
2	RED/WHT
3	ORA/WHT
4	YEL/WHT
5	GRN/WHT
6	BLU/WHT
7	VIO/WHT
8	GRY/WHT
9	BRN/BLK
10	RED/BLK
11	ORA/BLK
12	YEL/BLK
13	GRN/BLK
14	BLU/BLK
15	VIO/BLK
16	WHT/BLK

RSC code for
2-way snake

1	BRN/WHT (Output)
2	RED/WHT (Output)
3	ORA/WHT (Output)
4	YEL/WHT (Output)
5	GRN/WHT (Output)
6	BLU/WHT (Output)
7	VIO/WHT (Output)
8	GRY/WHT (Output)
9	BRN/BLK (Input)
10	RED/BLK (Input)
11	ORA/BLK (Input)
12	YEL/BLK (Input)
13	GRN/BLK (Input)
14	BLU/BLK (Input)
15	VIO/BLK (Input)
16	WHT/BLK (Input)

THE FOLLOWING

IS

821A MATERIAL

1821A-TAPE SYSTEM MULTI-CONN. BRK

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ17	SJ18	CKT.
		E 4				A 15		SS 9
		E 6				C 15		SS 10
		E 8				E 15		SS 11
		E 10				G 15		SS 12
			E 4			B 16		SS 13
			E 6			D 16		SS 14
			E 8			F 16		SS 15
			E 10			H 16		SS 16
				E 4		A 17		SS 17
				E 6		C 17		SS 18
				E 8		E 17		SS 19
				E 10		G 17		SS 20
					E 4		A 13	SS 21
					E 6		C 13	SS 22
					E 8		E 13	SS 23
					E 10		G 13	SS 24
D 5						A 19		RR 1
C 6						C 19		RR 2
D 7						E 19		RR 3
C 8						G 19		RR 4
	D 5					B 20		RR 5
	C 6					D 20		RR 6
	D 7					F 20		RR 7
	C 8					H 20		RR 8
		D 5				A 21		RR 9
		C 6				C 21		RR 10
		D 7				E 21		RR 11
		C 8				G 21		RR 12
			D 5			B 22		RR 13
			C 6			D 22		RR 14
			D 7			F 22		RR 15
			C 8			H 22		RR 16
				D 5		A 23		RR 17
				C 6		C 23		RR 18
				D 7		E 23		RR 19
				C 8		G 23		RR 20
					D 5		A 19	RR 21
					C 6		C 19	RR 22
					D 7		E 19	RR 23
					C 8		G 19	RR 24
F 1	F 1	F 1	F 1	F 1	F 1	B 6	B 6	GND.
F 3	F 3	F 3	F 3	F 3	F 3	D 6	D 6	GND.
F 5	F 5	F 5	F 5	F 5	F 5	F 6	F 6	GND.
F 7	F 7	F 7	F 7	F 7	F 7	H 6	H 6	GND.
F 9	F 9	F 9	F 9	F 9	F 9	B 12	B 12	GND.
F 11	F 11	F 11	F 11	F 11	F 11	D 12	D 12	GND.
E 12	E 12	E 12	E 12	E 12	E 12	F 12	F 12	GND.
						H 12	H 12	GND.
						B 18	B 18	GND.
						D 18	B 18	GND.
						F 18	F 18	GND.
						H 18	H 18	GND.

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ [illegible]	JD	SJ17	SJ18	CKT.	WIRE
B7						B 13				BIAS	SHIELD
	B7					D 13				BIAS	"
		B7	B7			F 13				BIAS	"
				B7	B7	H 13				BIAS	"
G8						B 9				-39V	ORG
	G8					D 9				-39V	"
		G8	G8			F 9				-39V	"
				G8	G8	H 9				-39V	"
G4						B 7				-24V	YEL
	G4					D 7				-24V	"
		G4	G4			F 7				-24V	"
				G4	G4	H 7				-24V	
						B 11	10			-47V	BLUE
						H 11	9			BIAS CONT	W/RED
						B 1	11			115VAC	RED
						D 1	12			115VAC	BLACK
						A 6		H24	H24	-39V.	W/ORG.
							1	B24	B24	YL. LT.	W/YEL
							2	D24	D24	SSB	W/GRY.
							5	F24	F24	RRB	W/VIO.
							8	B26	B26	LT. GND	W/BLK
							4	E25	E25	PRELIM	VIO.
B5	B5	B5	B5	B5	B5		7	G25	G25	30 IPS	GREY
						A 8				GND.	
						C 8				GND.	
						E 8				GND.	
						G 8				GND.	
						A 10				GND.	
						C 10				GND.	
						E 10				GND.	
						G 10				GND.	
						A 12				GND.	
						C 12				GND.	
						E 12				GND.	
						G 12				GND.	
						A 4	3			BIAS DRIVE	YEL.
						C 4	6			BIAS DRIVE	103 DECK 440T.

8X1A-TAPE SYSTEM MULTI-CONN. [illegible]

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ17	SJ18	CKT.
C 2						A 1		IN 1
B 3						C 1		IN 2
B 11						E 1		IN 3
C 12						G 1		IN 4
	C 2					B 2		IN 5
	B 3					D 2		IN 6
	B 11					F 2		IN 7
	C 12					H 2		IN 8
		C 2				A 3		IN 9
		B 3				C 3		IN 10
		B 11				E 3		IN 11
		C 12				G 3		IN 12
			C 2			B 4		IN 13
			B 3			D 4		IN 14
			B 11			F 4		IN 15
			C 12			H 4		IN 16
				C 2		A 5		IN 17
				B 3		C 5		IN 18
				B 11		E 5		IN 19
				C 12		G 5		IN 20
					C 2		A 1	IN 21
					B 3		C 1	IN 22
					B 11		E 1	IN 23
					C 12		G 1	IN 24
G 2						A 7		OUT 1
G 6						C 7		OUT 2
G 10						E 7		OUT 3
F 13						G 7		OUT 4
	G 2					B 8		OUT 5
	G 6					D 8		OUT 6
	G 10					F 8		OUT 7
	F 13					H 8		OUT 8
		G 2				A 9		OUT 9
		G 6				C 9		OUT 10
		G 10				E 9		OUT 11
		F 13				G 9		OUT 12
			G 2			B 10		OUT 13
			G 6			D 10		OUT 14
			G 10			F 10		OUT 15
			F 13			H 10		OUT 16
				G 2		A 11		OUT 17
				G 6		C 11		OUT 18
				G 10		E 11		OUT 19
				F 13		G 11		OUT 20
					G 2		A 7	OUT 21
					G 6		C 7	OUT 22
					G 10		E 7	OUT 23
					F 13		G 7	OUT 24
E 4						A 13		SS 1
E 6						C 13		SS 2
E 8						E 13		SS 3
E 10						G 13		SS 4
	E 4					B 14		SS 5
	E 6					D 14		SS 6
	E 8					F 14		SS 7
	E 10					H 14		SS 8

SJ 1	SJ 2	SJ 3	SJ 4	SJ 5	SJ 6	SJ 13	SJ 14	CKT.
		D 3				B 24		E 9
		A 6				D 24		E 10
		A 8				F 24		E 11
		D 9				H 24		E 12
			D 3			B 25		E 13
			A 6			D 25		E 14
			A 8			F 25		E 15
			D 9			H 25		E 16
				D 3		B 26		E 17
				A 6		D 26		E 18
				A 8		F 26		E 19
				D 9		H 26		E 20
					D 3		B 22	E 21
					A 6		D 22	E 22
					A 8		F 22	E 23
					D 9		H 22	E 24

821A-24 TAPE SYSTEM MULTI-CONN. BRK.

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ13	SJ14	CKT.
	D 1					A 13		RH 5
	E 2					B 14		RC 5
	A 2					C 13		RH 6
	A 4					D 14		RC 6
	A 12					E 13		RH 7
	A 10					F 14		RC 7
	D 13					G 13		RH 8
	D 11					H 14		RC 8
		D 1				A 15		RH 9
		F 2				B 16		RC 9
		A 2				C 15		RH 10
		A 4				D 16		RC 10
		A 12				E 15		RH 11
		A 10				F 16		RC 11
		D 13				G 15		RH 12
		D 11				H 16		RC 12
			D 1			A 17		RH 13
			E 2			B 18		RC 13
			A 2			C 17		RH 14
			A 4			D 18		RC 14
			A 12			E 17		RH 15
			A 10			F 18		RC 15
			D 13			G 17		RH 16
			D 11			H 18		RC 16
				D 1		A 19		RH 17
				E 2		B 20		RC 17
				A 2		C 19		RH 18
				A 4		D 20		RC 18
				A 12		E 19		RH 19
				A 10		F 20		RC 19
				D 13		G 19		RH 20
				D 11		H 20		RC 20
					D 1		A 11	RH 21
					E 2		B 12	RC 21
					A 2		C 11	RH 22
					A 4		D 12	RC 22
					A 12		E 11	RH 23
					A 10		F 12	RC 23
					D 13		G 11	RH 24
					D 11		H 12	RC 24
						A 21	A 21	GND.
						C 21	C 21	GND.
						E 21	E 21	GND.
						G 21	G 21	GND.
D 3						B 22		E 1
A 6						D 22		E 2
A 8						F 22		E 3
D 9						H 22		E 4
	D 3					B 23		E 5
	A 6					D 23		E 6
	A 8					F 23		E 7
	D 9					H 23		E 8

SJ1 - SJ6 - PREAMP

SJ13, SJ14 - HEADS

SJ15, SJ16 - INPUT-OUTPUT

SJ11 - BIAS

JD - TO DECK

SJ15, SJ16 - 5#+

OUT'S = PLAY

IN'S = REC

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ13	SJ14	CKT.
H 3						A 1		PBH 1
H 1						B 2		PBC 1
H 7						C 1		PBH 2
H 5						D 2		PBC 2
H 11						E 1		PBH 3
H 9						F 2		PBC 3
H 13						G 1		PBH 4
G 12						H 2		PBC 4
	H 3					A 3		PBH 5
	H 1					B 4		PBC 5
	H 7					C 3		PBH 6
	H 5					D 4		PBC 6
	H 11					E 3		PBH 7
	H 9					F 4		PBC 7
	H 13					G 3		PBH 8
	G 12					H 4		PBC 8
		H 3				A 5		PBH 9
		H 1				B 6		PBC 9
		H 7				C 5		PBH 10
		H 5				D 6		PBC 10
		H 11				E 5		PBH 11
		H 9				F 6		PBC 11
		H 13				G 5		PBH 12
		G 12				H 6		PBC 12
			H 3			A 7		PBH 13
			H 1			B 8		PBC 13
			H 7			C 7		PBH 14
			H 5			D 8		PBC 14
			H 11			E 7		PBH 15
			H 9			F 8		PBC 15
			H 13			G 7		PBH 16
			G 12			H 8		PBC 16
				H 3		A 9		PBH 17
				H 1		B 10		PBC 17
				H 7		C 9		PBH 18
				H 5		D 10		PBC 18
				H 11		E 9		PBH 19
				H 9		F 10		PBC 19
				H 13		G 9		PBH 20
				G 12		H 10		PBC 20
					H 3		A 1	PBH 21
					H 1		B 2	PBC 21
					H 7		C 1	PBH 22
					H 5		D 2	PBC 22
					H 11		E 1	PBH 23
					H 9		F 2	PBC 23
					H 13		G 1	PBH 24
					G 12		H 2	PBC 24
D 1						A 11		RH 1
E 2						B 12		RC 1
A 2						C 11		RH 2
A 4						D 12		RC 2
A 12						E 11		RH 3
A 10						F 12		RC 3
D 13						G 11		RH 4
D 11						H 12		RC 4

8214-TAPE SYSTEM - S[illegible]SYNC PANEL

SJ10	SJ11	SJ12	SJ13	SJ14	SJ15	SJ16	SJ17	SJ18	SJ19	CKT.
							13A			SS 1
							13C			2
							13E			3
							13G			4
9B							14B			5
9D							14D			6
9F							14F			7
9H							14H			8
	9B						15A			9
	9D						15C			10
	9F						15E			11
	9H						15G			12
		9B					16B			13
		9D					16D			14
		9F					16F			15
		9H					16H			16
			9B				17A			17
			9D				17C			18
			9F				17E			19
			9H				17G			20
				9B				13A		21
				9D				13C		22
				9F				13E		23
				9H				13G		SS 24
					26		19A			RR 1
					27		19C			2
					28		19E			3
					29		19G			4
10A					30		20B			5
10C					31		20D			6
10E					32		20F			7
10G					33		20H			8
	10A				34		21A			9
	10C				35		21C			10
	10E				36		21E			11
	10G				37		21G			12
		10A				26	22B			13
		10C				27	22D			14
		10E				28	22F			15
		10G				29	22H			16
			10A			30	23A			17
			10C			31	23C			18
			10E			32	23E			19
			10G			33	23G			20
				10A		34		19A		21
				10C		35		19C		22
				10E		36		19E		23
				10G		37		19G		RR 24

Cable code

[illegible]

824 TAPE SYSTEM — SEL-SYNC

SJ10	SJ11	SJ12	SJ13	SJ14	SJ15	SJ16	SJ17	SJ18	SJ19	CKT.
										Vu 1
										2
										3
										4
11B										5
11D										6
11F										7
11H										8
	11B									9
	11D									10
	11F									11
	11H									12
		11B								13
		11D								14
		11F								15
		11H								16
			11B							17
			11D							18
			11F							19
			11H							20
				11B						21
				11D						22
				11F						23
				11H						Vu 24
					1					E OUT 1
					2					2
					3					3
					4					4
12A					5					5
12C					6					6
12E					7					7
12G					8					8
	12A				9					9
	12C				10					10
	12E				11					11
	12G				12					12
		12A				1				13
		12C				2				14
		12E				3				15
		12G				4				16
			12A			5				17
			12C			6				18
			12E			7				19
			12G			8				20
				12A		9				21
				12C		10				22
				12E		11				23
				12G		12				Eo 24
13B	13B	13B	13B	13B			6B, 12B	6B, 12B		GND
13D	13D	13D	13D	13D			6D, 12D	6D, 12D		GND
13F	13F	13F	13F	13F			6F, 12F	6F, 12F		GND
13H	13H	13H	13H	13H			6H, 12H	6H, 12H		GND
					39-50	39-50				GND-BUSS BAR
									30	GND
1B	1B	1B	1B	1B			18B	18B		GND
1D	1D	1D	1D	1D			18D	18D		GND
1F	1F	1F	1F	1F			18F	18F		GND
1H	1H	[illegible]	1H	1H			18H	18H		GND

mixed

paired cable

shielded

STEPHENS ELECTRONICS, INC

MAINTENANCE REQUEST

Company Name: RSC	Job #: 418
Contact: Bruce Bidlack	Date: 2/23/82
Phone #: 7667191	Date needed by: ASA Practical

Last used: Ed Greene 15 IPS in Italy

Repairs to be made: Servo not "reliable"/stable.
ϕ lock meter swings (out of lock range condition)
Speed trim sometimes could adjust for phaselock
but eventually could not trim servo into
phase lock. [later went to "resolve" mode
with no ~~ext~~ ref. to use freerunning/wild
speed.] even in phase lock there is
excessive wavering of meter.

2 weeks ago we tried 1) increasing R of ~~speed trim~~
(added series resistor)
at trimpot location
2) attempted to
readjust photo-R's
at idler wheel.

Received by: D Crine
Stephens Electronics

Picked up by: ______________________ Date: ____________

- [ ] Pick up charges
- [ ] Delivery charges

Terms:
- [ ] C.O.D.
- [ ] Net 10 days

1380!

13 ←	A3M#1	1	26
	#2	2	27
	#3	3	28
	#4	4	29
	#5	5	30
	#6	6	31
	#7	7	32
	#8	8	33
	#9	9	34
	#10	10	35
	#11	11	36
24 ←	A3M#12	12	37
1 ←	A3F#1	13	38
	#2	14	39
	#3	15	40
	#4	16	41
	#5	17	42
	#6	18	43
	#7	19	44
	#8	20	45
	#9	21	46
	#10	22	47
	#11	23	48
12 ←	A3F#12	24	49
	No CONN.	25	50

NO connection

common gnd for both ins & outs.

Carl Jacobson
Professional Audio
(714) 870-4762

DAILY RENTAL RATES

MICROPHONES
Continued

ELECTRO-VOICE

E.V.	DS35	UNI-DIRECTIONAL SUPER CARDIOID	$ 9.00
E.V.	635A	OMNI-DIRECTIONAL	$ 8.00
E.V.	RE15	UNI-DIRECTIONAL	$ 10.00
E.V.	RE20	UNI-DIRECTIONAL	$ 20.00

NEUMAN

NEUMAN	KM-84	STUDIO CONDENSER, CARDIOID	$ 18.00
NEUMAN	KM-56	3 PATTERN TUBE CONDENSER	$ 50.00
NEUMAN	M49	TUBE CONDENSER	$100.00
NEUMAN	U47FET	CONDENSER	$ 25.00
NEUMAN	U47VF14	TUBE	$100.00
NEUMAN	U67	TUBE CONDENSER	$100.00
NEUMAN	U87	STUDIO CONDENSER	$ 25.00
NEUMAN	U89	STUDIO CONDENSER	$ 30.00

RCA

RCA	44BX	RIBBON	$ 30.00
RCA	77DX	RIBBON	$ 30.00

SENNHEISER

SENN.	K3U	MODULAR CONDENSER SYSTEM	$ 20.00
SENN.	MKH415	SHORT SHOTGUN	$ 18.00
SENN.	MKH815	LONG SHOTGUN	$ 20.00
SENN.	MD421	UNI-DIRECTIONAL, DYNAMIC	$ 10.00
SENN.	MZN-16TU	POWER SUPPLY	$ 5.00

ARNIE converter [illegible] with Modeline Servo
[illegible] V (Input PLL Unregulated) = 27.1
C223 Regulated = 24.5 unchanging

ARNIE converter W/ [illegible] Servo
Input PLL Unregulated = 25.3
C223 PLL Regulated 24.4

ARNIE w/ 811-D Servo =
In = 26.2
Reg = 24.5

ARNIE P.S.	UNReg	60.4	Reg	46.5
		59.8		46.5 moving
811-D	UnReg	58.7		40.0
		58.2		40.0 moving
Madeline	Unre	61.7		45.3
		60.6		45.3

811 D servo & Converter
Input 26.3
Reg 23.7 → 22.8 moving

RECORDING SERVICES COMPANY
10824 VENTURA BOULEVARD
STUDIO CITY, CA 91604
(213) 766-7191

Report on 811-D Servo

I with Various Resolver card - 15 ips

(A)

[illegible]	PL regulator voltage [illegible] ery	Play [illegible]	F.F. [illegible]
C 223	- 22.8	- 22.5	- 21.9
C 224	- 22.1	- 21.9	- 21.9

Speed Trim [illegible] range & flutter [illegible] [illegible] but is stable [illegible] range.

(B)

C 224	- 23.9	- 23.9	- 23.9
C 223	- 24.6	- 24.6	- 24.6

Speed TRIM = Same as A

(811D)

C 224	- 23.1	22.3	changes
C 223	- 23.8	23.1	

Speed [illegible] barely [illegible] stably [illegible] [illegible]
[illegible] [illegible] [illegible]

11-5-81

RECORDING SERVICES COMPANY

RSC

Fluter Test – Stephens 821-B – [illegible]?

	Head	Center	TAIL
TRK 12 .5 – 30 –		.06	.02
30 – 300 –	.03	.03	.05
300 – 5000 –	.08	.055	
Hold [illegible]	9.3 v	9.6	10.8

Stephens 821 · A

	Head	Center	Tail
TRK 11 .5 – 30	.06	.06	.05
30 – 300	.09	.1	.1
300 – 5000	.06	.05	.05
	10.	10.5	10.6

slightly better

LINE VOLTAGE [illegible]

213-766-7191 10824 VENTURA BLVD. STUDIO CITY, CA. 91604

RECORDING SERVICES COMPANY

2414 W. OLIVE AVE.
BURBANK CA. 91506
(818) 843-8640
(800) 451-5614

4/22/85

PACKING LIST FOR JAMACA/Warner Bros Pictures C#265 307

ALL ITEMS ARE MANUFACTURED IN THE UNITE STATES OF AMERICA.

1) STEPHENS 821A 24-TRACK RECORDER SN# 1040 Value of 21,000.00

2) 25 XLR FEMALE X TT PATCH CORDS. RSC OWNED VALUE OF $500.

3) 25 XLR MALE X TT PATCH CORDS. RSC OWNED VALUE OF $500.

4) ONE 220V TO 110V STEP DOWN TRANSFORMER VALUE $20.00

5) STEPHENS SPARE PARTS KIT (HOPEFULLY NOT NEEDED)

6) ONE 2" X 10 1/2" EMPTY TAKE UP REEL.

7) ONE 2" SPLICE BLOCK NO S/N# VALUE $100.

8) ONE ROLL 250 X 2" X 2500' TAPE FROM STEVE GOLMAN.

9) OPERATIONS MANUAL FOR STEPHENS.

RSC
RECORDING SERVICES COMPANY
2414 W. OLIVE AVE.
BURBANK CA. 91506
(818) 843-8640
(800) 451-5614

4/20/85

JAMACA/WARNER BROS. PICTURES

TO AUDIO ENGEINEER:

HINTS ON STEPHENS OPERATION:

The machine has been aligned for +6, 30ips, 250 tape, using the sample tape given us by Steve Goldman. All functions check out 100%. If you need assistance, call RSC 800-451-5614, or (818) 843-6800, talk to Julie or Tom or Ken.

Tones have been recorded on the reel of 250 tape at the head. I suggest if they playback even close to 0 VU in Jamaca, not to realign. If realignment is necessary overbias 1 db @ 1 K for best flat frequency response. DO NOT adjust low frequency response, it should be close to 0 VU.

Enclosed is a 220 V to 110 V step down transformer for the machine. We think the Power in Jamaca is 50 hz, 220 V, so PLEASE use the transformer for the Stephens machine. Also, please try to get as much air as possible to the Power Supply since it will probably get warmer than normal running on 50 hz.

The speed of the machine uses a 60 hz crystal time base so the Jamaca 50hz. will not be a problem - only the 220V.

At the rear of the machine is a switch for external sync resolving. IMPORTANT the switch is in the "NORMAL" POSITION, at all times. Please check upon arrival in Jamaca.

To arm machine for record use the knob on the right hand side of the VU meter panel while depressing the "REC" button next to it (NOT DECK record button). This is also used for the other functions - input, Play, Mute (you won t need Mute). Depress the "play" one to deselect from record ready.

All other functions of the machine are very similar to any studio recorder, the enclosed manual covers tape threading etc. however refer to the previous paragraph for Channel select functions on the multiplexing of the VU panel.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200 () A
() B
() ATR100 () C
() D
() ______ () ______ [illegible]

[illegible]
24 TRK

Date: [illegible]/17

Your name: [illegible]

Client/job
contact/phone

Nature of problem as first noted:
(how long machine running, settings,
how discovered, etc.)

[illegible] 3 [illegible] 18 [illegible]
[illegible]
They did work in Playback

Initial corrective action taken:

[illegible]
[illegible]
[illegible] JM?

Other clues:

[illegible]

---

machine worked fine when I tried it [illegible]
[illegible]
(meters were fine.)

Thank you for taking the time to fill out this form.

RECORD   '66-7191

TROUBLE REPORT

() 1200 () A
() B
()ATR 100 () C
() D
() Stephens () ___

1/11-A B

Date:

Your name:

Client/job
contact/phone T.H.

Nature of problem as first noted:
(how long machine running,
settings, how discovered, etc.)

Tape Lifter Binds — Doesn't lift Tape properly.

~~Initial~~ corrective action taken: 1/14/82

tightened allen screws
@ shaft & solenoid junction

JH

Other clues:

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200 () A
() B
() ATR100 () C
() D
() ______ () E
() F
() Ad-Sm () ______
() Q Lock
() DOLBY______

Date: 6-21-83

Your name: JOHN

Client/job
contact/phone STEPHENS
821

Circle: 7½ 15 30 ips +3 ______ (other) 250 456 ______ PBO (other)

Nature of problem as first noted:
(how long machine running, settings,
how discovered, etc.)

COULDN'T ESTABLISH THAT DISTORTION
IS A COMMON CHANNEL ANOMALY
CHS 1, 2, & 4 GOT .03 & .11 ± .02
CH 3 GOT [illegible] .29 ± .04 @ 01:3 [illegible] TIME

Initial corrective action taken:

[illegible] BECAUSE FLUTTER
IS DIRECTLY VISIBLE BY WATCHING
THE FLUCTUATIONS IN THE [illegible] A
METER [illegible], WHILE MONITORING
FL OUTPUT IN JBL'S. IS THIS CAUSED
BY TAPE SLIPPAGE, OR THE SPEED
COMPENSATOR [illegible] TOO SLOW, OR
VARIATIONS IN PATH [illegible]?

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

Date: 6-24-83

Your name: [illegible]

Client/job [illegible]
contact/phone

() 1200 () A
() B
() ATR100 () C
() D
(✓) [illegible] () E
() F
() Ad-Sm (✓) 16 trk
() Q Lock
() DOLBY______

Circle: 7½ 15 30 ips +3 ____ (other) 250 456 ____ (other) PBO

Nature of problem as first noted:
(how long machine running, settings, how discovered, etc.)

Punch Out Button was dangling and screw chassis stripped.

Should remove switch completely ®

Initial corrective action taken:

with switch mount off there was enough "meat" left on existing threads.
No further action (no new threading)

→ Switch removed. Some R's + C's & wires to A/S interface remain. will remove soon as I figure out what it is.

Thank you for taking the time to fill out this form.

[illegible] 6/29

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200 () A
() B
()ATR 100 () C
() D
()Stevers () ___
8 trk

Date: 5/11/82

Your name: Ken

Client/job
contact/phone Paramount

Nature of problem as first noted:
(how long machine running,
settings, how discovered, etc.)

Playback HF Ch. 1 Pot broken,
Playback HF Ch 3 Pot not enough
resistance to make Ø V.U.

Initial corrective action taken:

Replaced Ch. 1 pot H.F.,
Added resistor to Ch 3. pot H.F.
in series

Other clues:

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200 () A
() B
() ATR100 () C
() D
(X) STER () 8 1/C

Date: 12/19/81

Your name: JOHN FROST

Client/job
contact/phone ______

Nature of problem as first noted:
(how long machine running, settings,
how discovered, etc.)

TRIM POT ON TRACK 4
HF PBEQ MUST BE replaced,
(stripped beyond usage)

Initial corrective action taken:

FOUND OUT RSC HAS NO
[illegible] POTS

Other clues:

merry christmas

[illegible]
J.R.

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200	() A
	() B
()ATR 100	() C
	() D
() Stephens	() E
	() F
() Ad-Sm	()______
() Q Lock	
() DOLBY______	

Date: 10/27/82

Your name: Jeff

Client/job
contact/phone

Circle: $7\frac{1}{2}$ 15 30 ips +3 ____ (other) 250 456 ____ (other) PBO

Nature of problem as first noted:
(how long machine running,
settings, how discovered, etc.)

One channel stuck in input at 30 ips only. 15 ips OK

Initial corrective action taken:

15/30 ips Low Freq EQ switching Fet Bad, Replaced. It works

Jeff 10/27/82

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

Date: 2-8-83

Your name: Rodney

Client/job
contact/phone

() 1200 () A
() B
() ATR100 () C
() D
✓ Stephens () E
() F
() Ad-Sm () 16 trk
() Q Lock
() DOLBY______

Circle: 7½ 15 30 ips +3 ____ (other) 250 456 ____ (other) PBO

Nature of problem as first noted:
(how long machine running, settings, how discovered, etc.)

Machine is stuck in Fast Forward

While rocking machine to a stop from Rewind, the problem occured.

Initial corrective action taken:

F.F. Switch was stuck on

Worked it a bit, seems OK now.

Rodney

2-8-83

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191

TROUBLE REPORT

() 1200 () A
() B
() ATR100 () C
() D
() ______ () E
() F
() Ad-Sm () ______
() Q Lock
() DOLBY______
STEPHENS 8 [illegible]

Date: 6-12-83

Your name: JTL

Client/job: PART
contact/phone

Circle: $7\frac{1}{2}$ 15 30 ips +3 ______ (other) 250 456 ______ (other) PBO

Nature of problem as first noted:
(how long machine running, settings,
how discovered, etc.)

1. ~~[illegible]~~

SOMETIMES [illegible] E [illegible] REW COMMAND [illegible]

~~[illegible]~~

Could Not Re-Create Problem [illegible] 6-15-83

6-16
[illegible] FRI ~~6~~ 17
[illegible]

Initial corrective action taken:

(2) PART HAD MUCH TROUBLE RECORDING & PLAYING [illegible] [illegible] UNSTABLE, TRACK [illegible] [illegible] TRIED [illegible] ETC. TO BE ABLE TO [illegible] [illegible] [illegible] THE MOUNTING CONTACT [illegible] RELAYS.

Traded out relays from 821 A
6-14-83 Paul W / S.W. / Rod

Thank you for taking the time to fill out this form.

RECORDING SERVICES COMPANY 766-7191 ARNIE STEPHENS

TROUBLE REPORT

() 1200 () A
() B
() ATR100() C
() D
() ______() E
() F
() Ad-Sm () ______
() Q Lock
() DOLBY______

Date: 9-20-83

Your name: Jon

Client/job
contact/phone LAS VEGAS

Circle: 7½ 15 & 30 ips +3 ______ (other) 250 456 ______ (other) PBO

Nature of problem as first noted:
(how long machine running, settings, how discovered, etc.)

FLUTTER AUDIBLE & UNSTABLE AT 15 IPS & 30 IPS, 10½" REELS

OTHER FUNCTIONS SEEM FINE

Initial corrective action taken:

Adjusted Servo

9-20-83 BB by Rod

Thank you for taking the time to fill out this form.

Cables all work. Every channel erases & repros

Rod

9-20-83

OK per Julie. 9/20

RECORDING SERVICES COMPANY 843-8640

TROUBLE REPORT

() 1200 () A
() B
() ATR100 () C
() D
(X) Stephens () E
() F
() Ad-Sm (X) 821A 24T
() Q Lock
() DOLBY______

Date: 7/22/84

Your name: Bruce

Client/job
contact/phone Mix @ RSC

Circle: 7½ 15 30 ips . +3 ____ (other) 250 456 ____ PBO (other)

Nature of problem as first noted:
(how long machine running, settings,
how discovered, etc.)

Takeup motor has bearing/brush noise (Thump once per revolution)
No apparent audible effect, yet.

Initial corrective action taken: None.

Thank you for taking the time to fill out this form.

9/1 Madecon Mum. only

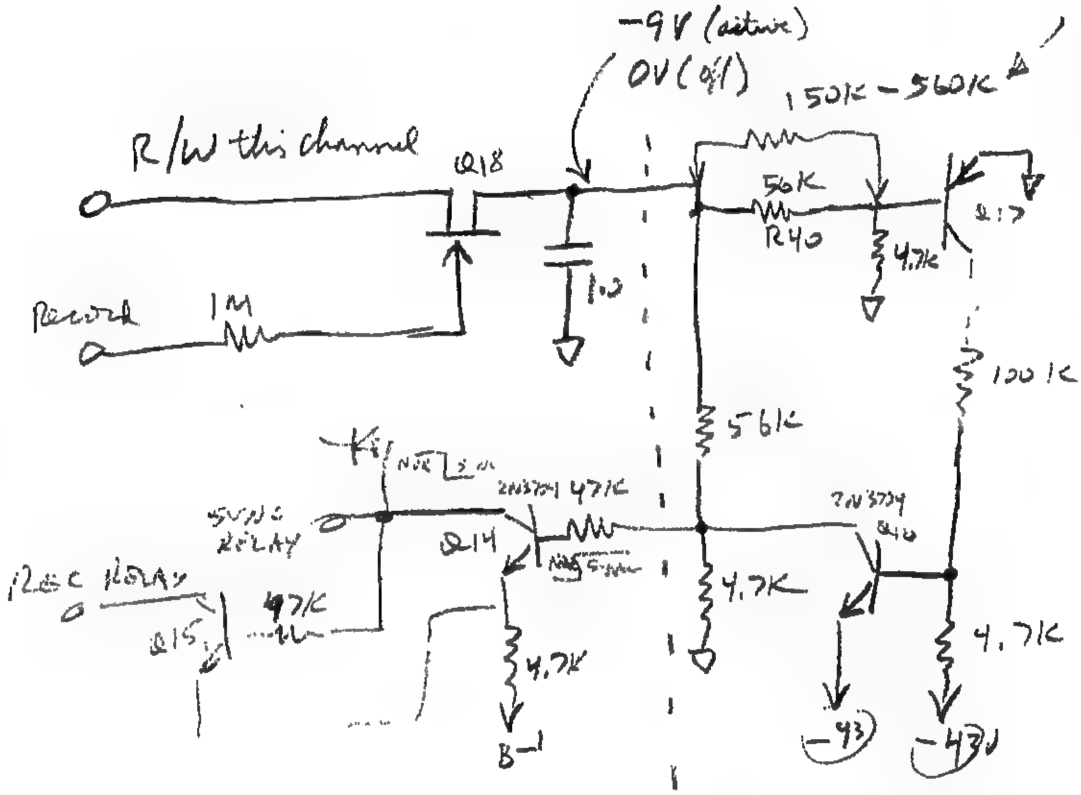
Record Latch Ckt

Stephens 52 A
4400 Line amp card.

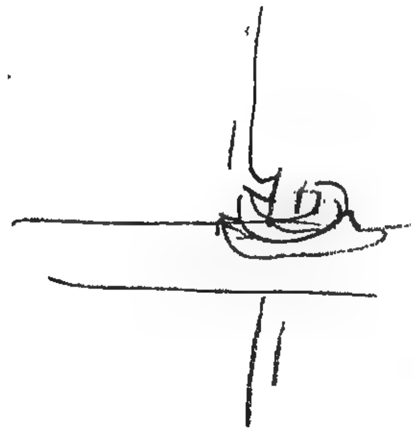
Latch dropout prevention.

in active mode,

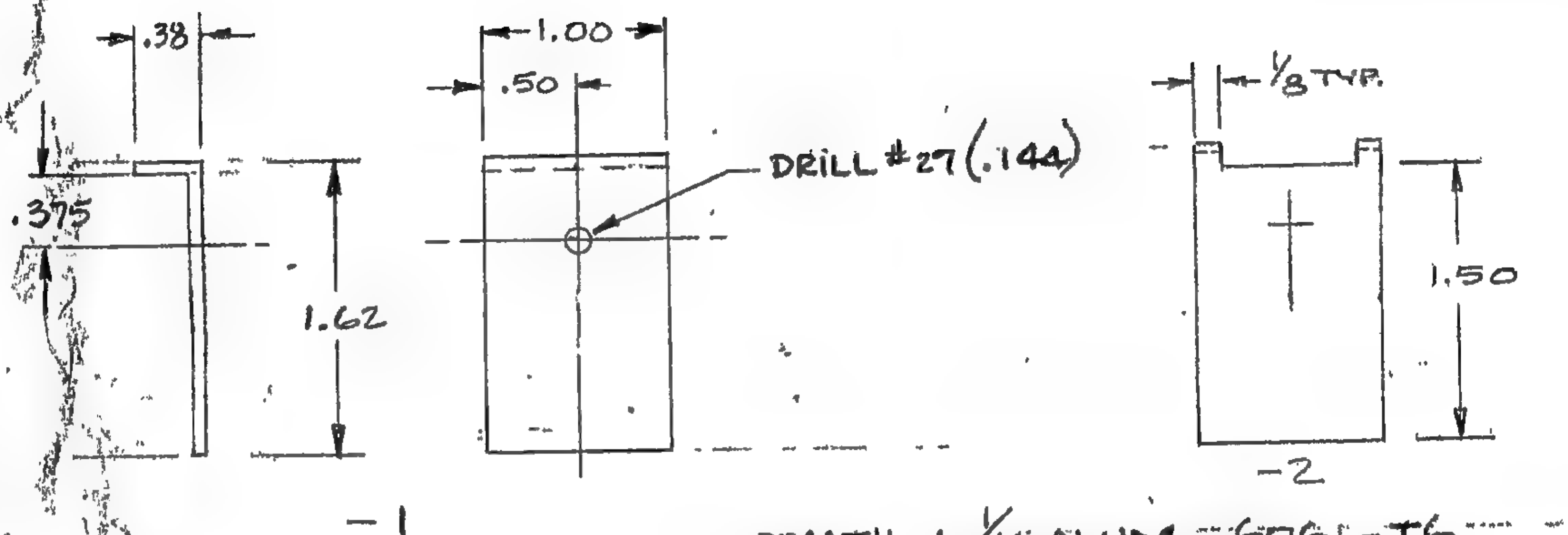
Lowers R40's effective resist. thus causing more current to flow thru Q17 Base 2N3702 thus 'tipping' it on harder if it turns on Q16 harder which keeps Q17 base on



LATCH CKT.



SYM.	REVISIONS DESCRIPTION	DATE
A	FINISH - BLACK ANODIZE	3-29-78
B	ADDED DASH NOS.	3/30/78



MAT'L: 1/16 ALUM 6061-T6
(A) = FINISH: ALODINE

DASH NO.	CONDITION
-1	WITHOUT NOTCH
-2	WITH NOTCH

.XX = ±.010 .XXX = ±.005

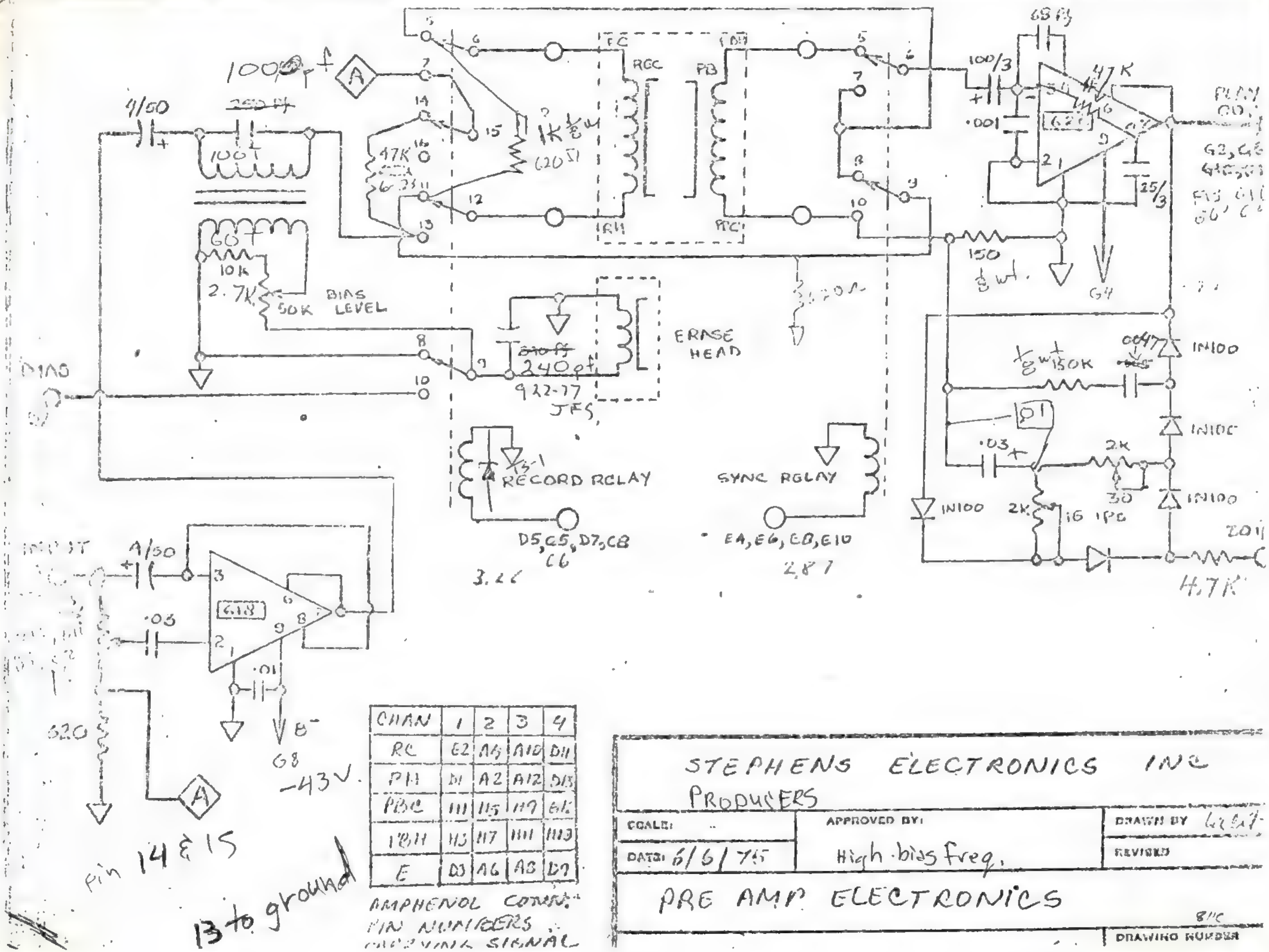
STEPHENS ELECTRONICS, INC.

SCALE: FULL	APPROVED BY:	DRAWN BY GEIGER
DATE: 1/10/74		REVISED

CLIP - VU METER RETAINING

MODEL 821A-24

DRAWING NUMBER REV 110520 B



CHAN	1	2	3	4
RC	E2	A4	A10	D11
PH	D1	A2	A12	D13
PBC	H1	H5	H9	G5
PBH	H3	H7	H11	H13
E	D3	A6	A8	D7

AMPHENOL CONN. PIN NUMBERS CARRYING SIGNAL

STEPHENS ELECTRONICS INC
PRODUCERS

SCALE:

DATE: 6/6/75

APPROVED BY: High bias freq.

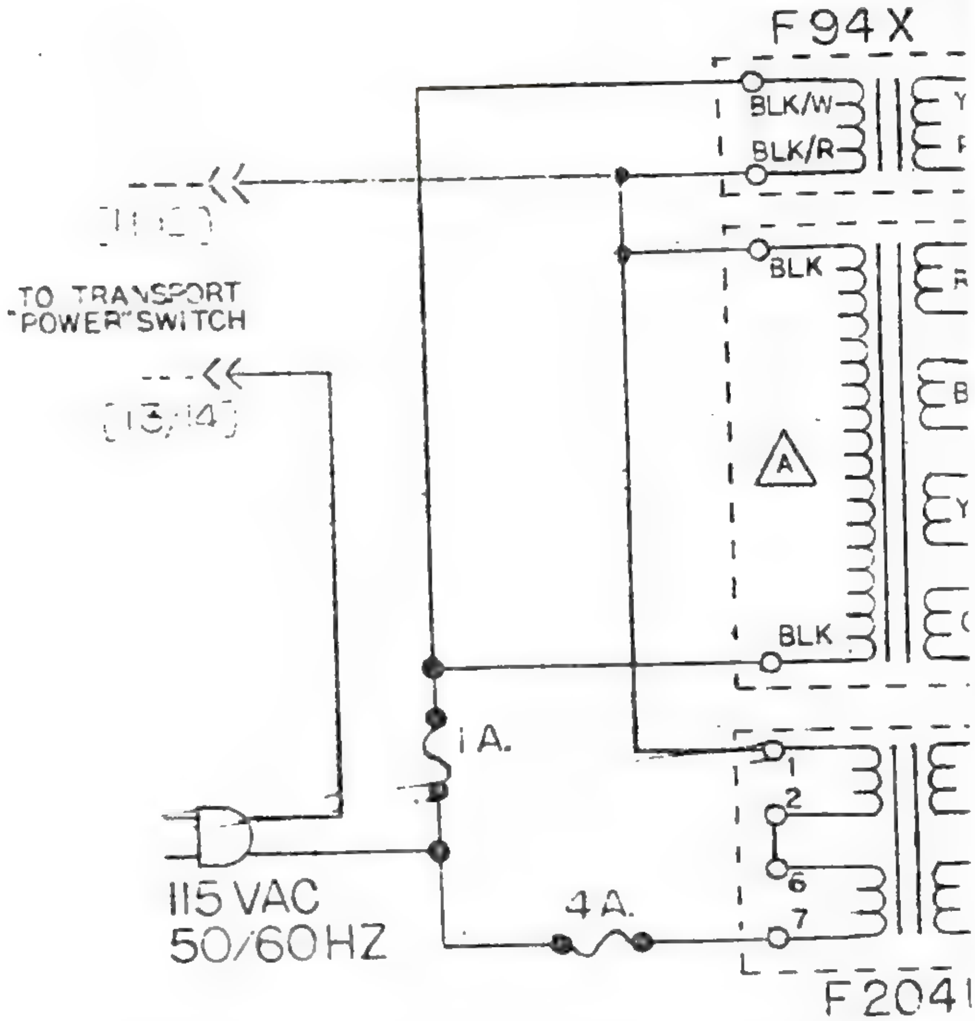
DRAWN BY

REVISED

PRE AMP ELECTRONICS

DRAWING NUMBER 8110

STEPHENS ELECTRONIC



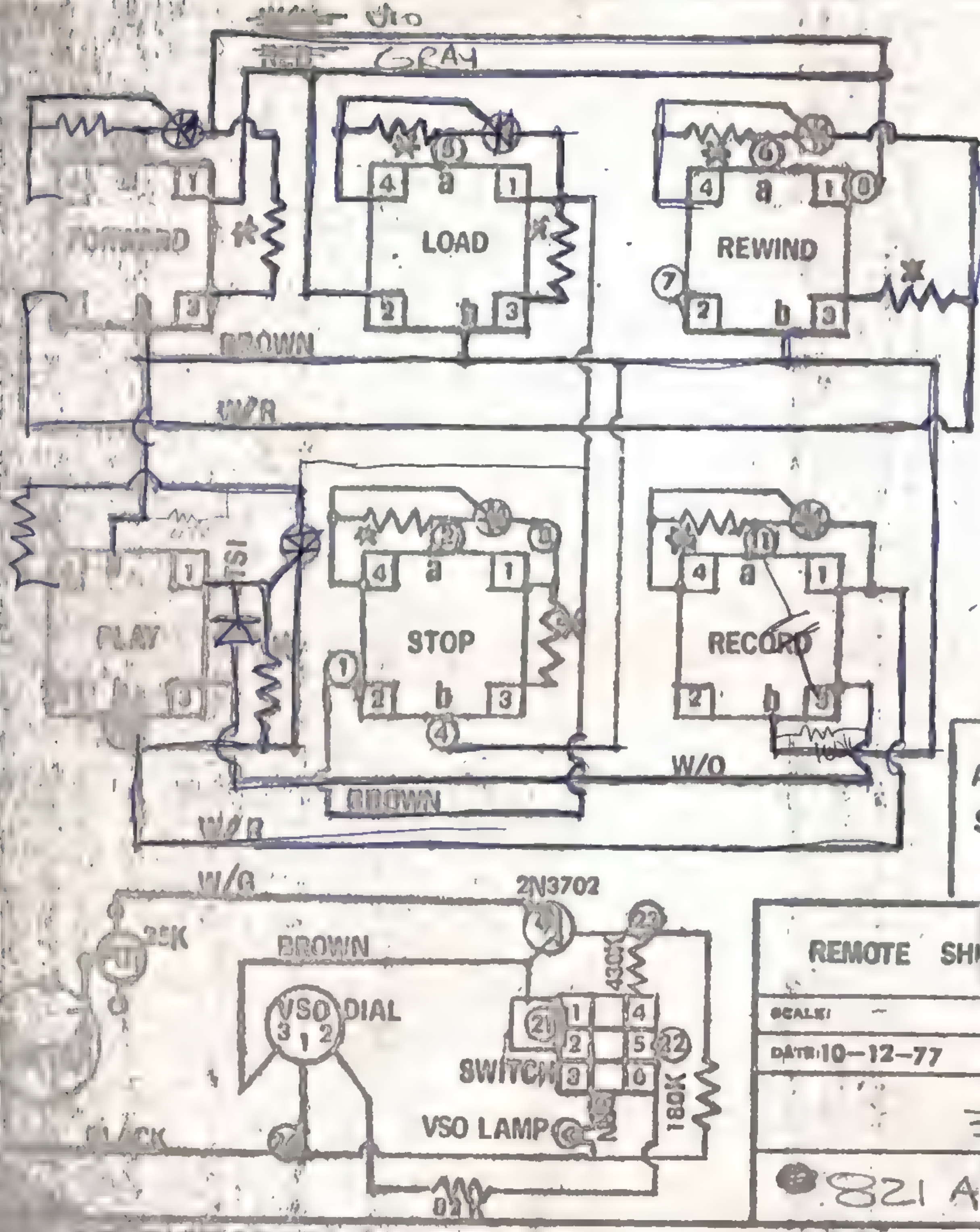
NOTES:

A F92A XFMR IN 4/16 SUPPLY
F68U " " 24 40 "

Q1,Q2 INT'L RECTIFIER TR-02
Q3 " " TR-05

[ ] CONNECTOR PIN NO'S

DRAWN BY GARY DAVIS TECHNICAL WRITING SE
3/6/74



AMPHENAL 57-30360 CONNECTOR

SWITCHES
1 BROWN LOAD 1
2 RED STOP A
3 ORANGE STOP ...
4 YELLOW LOAD B
5 GREEN LOAD A
6 BLUE REWIND A
7 VIOLET REWIND 2
8 GREY LOAD 2
9 WHITE FORWARD A
10 BLACK RECORD 1
11 W/YELLOW RECORD A
18 W/VIOLET PANEL (GRND) 50 Pin

VSO
21 W/BLUE
22 W/RED
23 W/GREEN
24 W/BLACK

27~29 JUMPER
31~32 JUMPER
12-17 19·20·25·26·28 NO CONNECTION

SCHEMATIC NOTES

ALL SCR - TIC 45
150 Ω

SWITCH- 1, 2, 3, 4

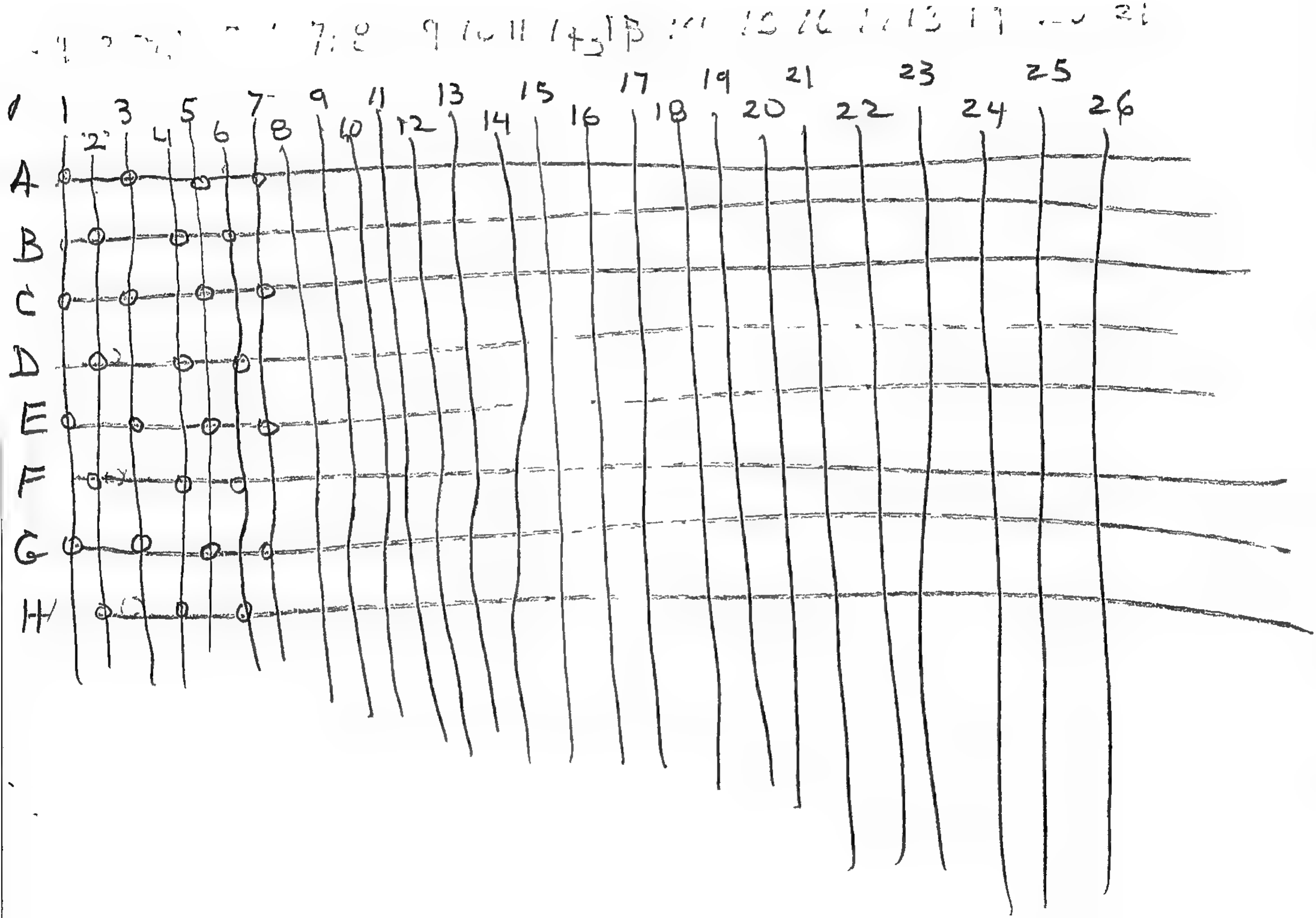
REMOTE SHUTTLE

SCALE: —
APPROVED BY:
DRAWN BY:
DATE: 10—12—77
REVISED

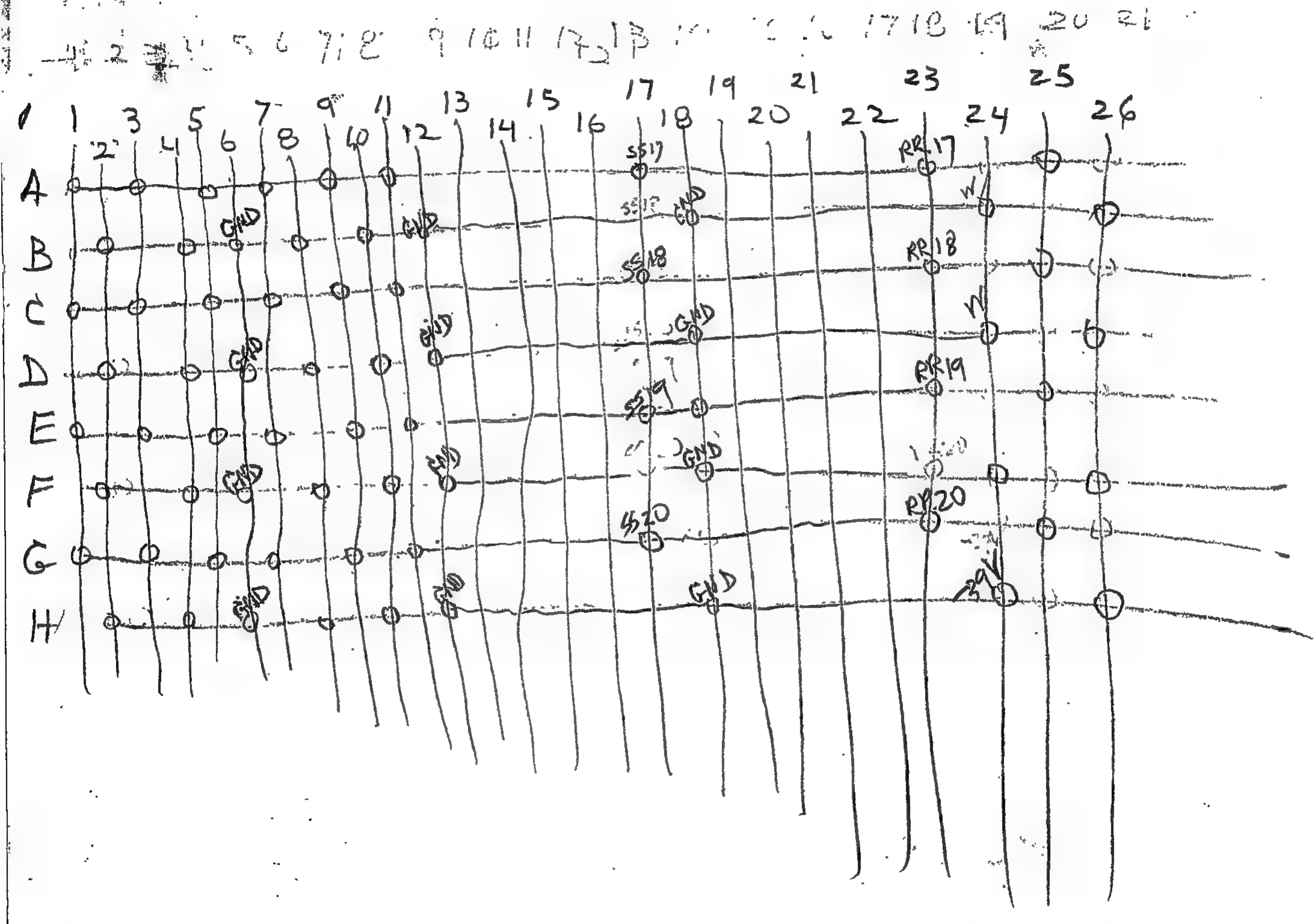
36 Pin Connect OLD STYLE

821 A ONLY

DRAWING NUMBER

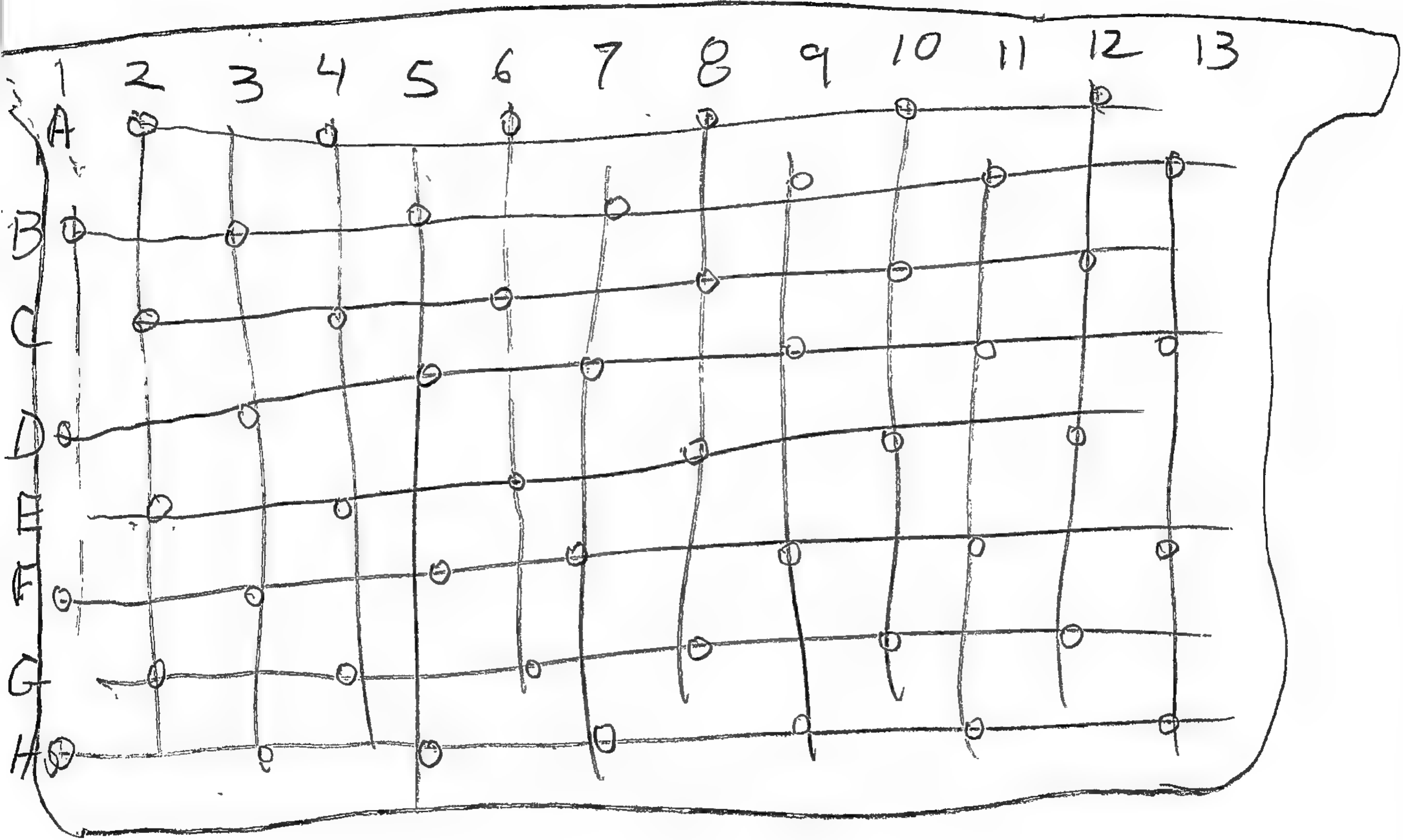


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
A
B
C
D
E
F
G
H

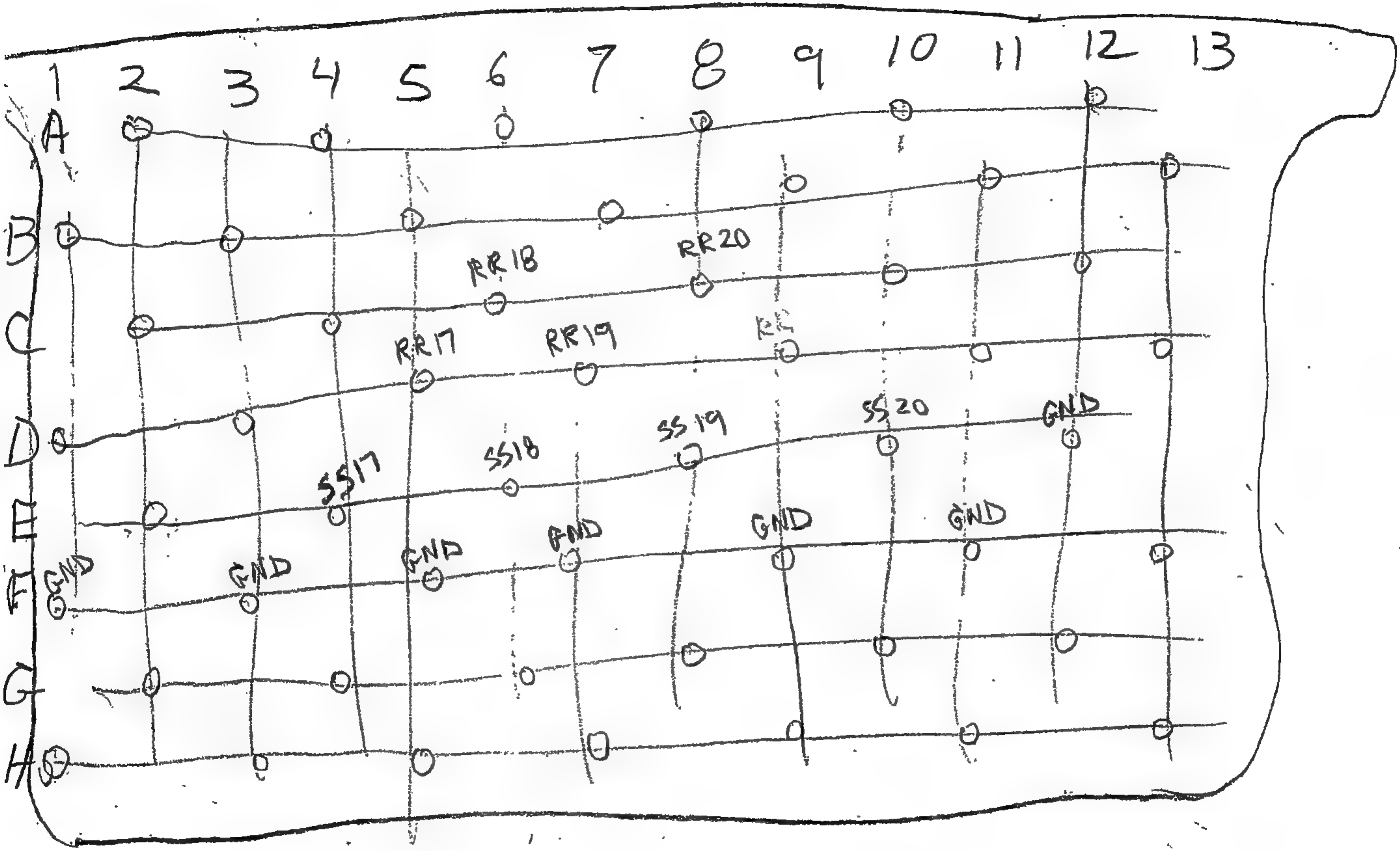


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
A
B
C
D
E
F
G
H
GND
SS17
SS18
SS19
SS20
RR17
RR18
RR19
RR20
W

Rear View stephen's SJ - Connectors



Rear View Stephens SJ - Connectors



[illegible]	[illegible]	SJ?	S??	SJ5	SJ6	SJ11	[illegible]	SJ12	[illegible]	[illegible]	[illegible]
[illegible]						[illegible]					
	B7					D 13					''
		B7	[illegible]			F 13				[illegible]	''
[illegible]				B7	B7	H 13				[illegible]	''
[illegible]						B 3				[illegible]	[illegible]
	B8					D 3				[illegible]	''
		G8	G8			F 3				[illegible]	''
				G8	G8	H 3				[illegible]	''
[illegible]						B 7				-24V	YEL
	G4					D 7				-24V	''
		G4	G4			F 7				-24V	''
				G4	G4	H 7				-24V	''
						B 11	10			-47V	BLU
						H 11	9			[illegible]	W/R
						B 1	11			[illegible]	RE
						D 1	12			[illegible]	BLA
						A 6		H24	H24	-39V	W/OR
							1	B24	B24	[illegible]	W/[illegible]
							2	D24	D24	SSR	W/GR
							5	F24	F24	SRR	W/VI
							8	B26	B26	LT. GND	W/BL
							4	E25	E25	PRELIM	VIO
B5	B5	B5	B5	B5	B5		7	G25	G25	30 IPS	GRE
						A 2				GND.	
						C 2				GND.	
						E 2				GND.	
						G 2				GND.	
						A 10				GND.	
						C 10				GND.	
						E 10				GND.	
						G 10				GND.	
						A 12				GND.	
						C 12				GND.	
						E 12				GND.	
						G 12				GND.	
						A 4	3			BIAS DRIVE	YE
						C 4	6			BIAS DRIVE	[illegible]

SJ10	SJ11	SJ12	SJ13	SJ14	SJ15	SJ16	SJ17	SJ18	SJ19	CKT
										VU 1
										2
										3
										4
11B										5
11D										6
11F										7
11H										8
	11B									9
	11D									10
	11F									11
	11H									12
		11B								13
		11D								14
		11F								15
		11H								16
			11B							17
			11D							18
			11F							19
			11H							20
				11B						21
				11D						22
				11F						23
				11H						VU 24
					1					EOUT 1
					2					2
					3					3
					4					4
12A					5					5
12C					6					6
12E					7					7
12G					8					8
	12A				9					9
	12C				10					10
	12E				11					11
	12G				12					12
		12A				1				13
		12C				2				14
		12E				3				15
		12G				4				16
			12A			5				17
			12C			6				18
			12E			7				19
			12G			8				20
				12A		9				21
				12C		10				22
				12E		11				23
				12G		12				EO 24
13B	13B	13B	13B	13B			6B, B12	6B, 12B		GND
13D	13D	13D	13D	13D			6D, 12D	6D, 12D		GND
13F	17F	13F	13F	13F			6F, 12F	6F, 12F		GND
13H	13H	13H	13H	13H			6H, 12H	6H, 12H		GND
					39-50	39-50				GND-BUSS BAR
									30	GND
1B	1B	1B	1B	1B			18B	18B		GND
1D	1D	1D	1D	1D			18D	18D		GND
1F	1F	1F	1F	1F			18F	18F		GND
1H	1H	[illegible]	1H	1H			18H	18H		END

matrix

Patch cords

shielded

[illegible] PANEL

SJ10	SJ11	SJ12	SJ13	SJ14	SJ15	SJ16	SJ17	SJ18	SJ19	CKT.
							13A			SS 1
							13C			2
							13E			3
							13G			4
9B							14B			5
9D							14D			6
9F							14F			7
9H							14H			8
	9B						15A			9
	9D						15C			10
	9F						15E			11
	9H						15G			12
		9B					16B			13
		9D					16D			14
		9F					16F			15
		9H					16H			16
			9B				17A			17
			9D				17C			18
			9F				17E			19
			9H				17G			20
				9B				13A		21
				9D				13C		22
				9F				13E		23
				9H				13G		SS 24
					26		19A			RR 1
					27		19C			2
					28		19E			3
					29		19G			4
10A					30		20B			5
10C					31		20D			6
10E					32		20F			7
10G					33		20H			8
	10A				34		21A			9
	10C				35		21C			10
	10E				36		21E			11
	10G				37		21G			12
		10A				26	22B			13
		10C				27	22D			14
		10E				28	22F			15
		10G				29	22H			16
			10A			30	23A			17
			10C			31	23C			18
			10E			32	23E			19
			10G			33	23G			20
				10A		34		19A		21
				10C		35		19C		22
				10E		36		19E		23
				10G		37		19G		RR 24

21A-TAPE SYSTEM MULTI-CONN. BRK

5 of 6

OK

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ17	SJ18	CKT.
		E 4				A 15		SS 9
		E 6				C 15		SS 10
		E 8				E 15		SS 11
		E 10				G 15		SS 12
			E 4			B 16		SS 13
			E 6			D 16		SS 14
			E 8			F 16		SS 15
			E 10			H 16		SS 16
				E 4		A 17		SS 17
				E 6		C 17		SS 18
				E 8		E 17		SS 19
				E 10		G 17		SS 20
					E 4		A 13	SS 21
					E 6		C 13	SS 22
					E 8		E 13	SS 23
					E 10		G 13	SS 24
D 5						A 19		RR 1
6						C 19		RR 2
7						E 19		RR 3
8						G 19		RR 4
	D 5					B 20		RR 5
	C 6					D 20		RR 6
	D 7					F 20		RR 7
	C 8					H 20		RR 8
		D 5				A 21		RR 9
		C 6				C 21		RR 10
		D 7				E 21		RR 11
		C 8				G 21		RR 12
			D 5			B 22		RR 13
			C 6			D 22		RR 14
			D 7			F 22		RR 15
			C 8			H 22		RR 16
				D 5		A 23		RR 17
				C 6		C 23		RR 18
				D 7		E 23		RR 19
				C 8		G 23		RR 20
					D 5		A 19	RR 21
					C 6		C 19	RR 22
					D 7		E 19	RR 23
					C 8		G 19	RR 24
1	F 1	F 1	F 1	F 1	F 1	B 6	B 6	GND.
3	F 3	F 3	F 3	F 3	F 3	D 6	D 6	GND.
5	F 5	F 5	F 5	F 5	F 5	F 6	F 6	GND.
7	F 7	F 7	F 7	F 7	F 7	H 6	H 6	GND.
9	F 9	F 9	F 9	F 9	F 9	B 12	B 12	GND.
11	F 11	F 11	F 11	F 11	F 11	D 12	D 12	GND.
F 12	E 12	F 12	E 12	E 12	E 12	F 12	F 12	GND.
						H 12	H 12	GND.
						B 18	B 18	GND.
						D 18	B 18	GND.
						F 18	F 18	GND.
						H 18	H 18	GND.

3/ A-TAPE SYSTEM MULTI COMM BRK

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ15	SJ1.	CKT.
		E 4				A 15		SS 9
		E 6				C 15		SS 10
		E 8				E 15		SS 11
		E 10				G 15		SS 12
			E 4			B 16		SS 13
			E 6			D 16		SS 14
			E 8			F 16		SS 15
			E 10			H 16		SS 16
				E 4		A 17		SS 17
				E 6		C 17		SS 18
				E 8		E 17		SS 19
				E 10		G 17		SS 20
					E 4		A 13	SS 21
					E 6		C 13	SS 22
					E 8		E 13	SS 23
					E 10		G 13	SS 24
5						A 19		RR 1
6						C 19		RR 2
7						E 19		RR 3
8						G 19		RR 4
	D 5					B 20		RR 5
	C 6					D 20		RR 6
	D 7					F 20		RR 7
	C 8					H 20		RR 8
		D 5				A 21		RR 9
		C 6				C 21		RR 10
		D 7				E 21		RR 11
		C 8				G 21		RR 12
			D 5			B 22		RR 13
			C 6			D 22		RR 14
			D 7			F 22		RR 15
			C 8			H 22		RR 16
				D 5		A 23		RR 17
				C 6		C 23		RR 18
				D 7		E 23		RR 19
				C 8		G 23		RR 20
					D 5		A 19	RR 21
					C 6		C 19	RR 22
					D 7		E 19	RR 23
					C 8		G 19	RR 24
1	F 1	F 1	F 1	F 1	F 1	B 6	B 6	GND.
3	F 3	F 3	F 3	F 3	F 3	D 6	D 6	GND.
5	F 5	F 5	F 5	F 5	F 5	F 6	F 6	GND.
7	F 7	F 7	F 7	F 7	F 7	H 6	H 6	GND.
9	F 9	F 9	F 9	F 9	F 9	B 12	B 12	GND.
11	F 11	F 11	F 11	F 11	F 11	D 12	D 12	GND.
E 12	E 12	E 12	E 12	E 12	E 12	F 12	F 12	GND.
						H 12	H 12	GND.
						B 18	B 18	GND.
						D 18	D 18	GND.
						F 18	F 18	GND.
						H 18	H 18	GND.

SJ1	SJ2	SJ3	SJ4	SJ5	SJ6	SJ11	PS JD	SJ17	SJ18	CKT.	WI
[illegible]	B7	B7		B7	B7	B 13				BIAS	SH
B7	[illegible]					D 13				BIAS	
		[illegible]	B7			F 13				BIAS	
	B7	B7		[illegible]	[illegible]	H 13				BIAS	
G 8						B 9				-39V	OR
	G 8					D 9				-39V	
		G 8	G 8			F 9				-39V	
				G 8	G 8	H 9				-39V	
G 4						B 7				-24V	Y
	G 4					D 7				-24V	
		G 4	G 4			F 7				-24V	
				G 4	G 4	H 7				-24V	
						B 11	10			-47V	BL
						H 11	9			BIAS COM	W/
						B 1	11			115VAC	R
						D 1	12			115VAC	BL
						A 6		H 24	H 24	-39V.	W/
							1	B24	B24	VL. LT.	W/
							2	D24	D24	SSB	W/
							5	F24	F24.	RRB	W/
							8	B26	B26	LT. GND	W/
							4	E25	E25	PRELIM	V
B5	B5	B5	B5	B5	B5		7	G25	G25	30 IPS	GR
						A 8				GND.	
						C 8				GND.	
						E 8				GND.	
						G 8				GND.	
						A 10				GND.	
						C 10				GND.	
						E 10				GND.	
						G 10				GND.	
						A 12				GND.	
						C 12				GND.	
						E 12				GND.	
						G 12				GND.	
						A 4	3			BIAS DRIVE	V
						C 4	6			BIAS DRIVE	10

7)

STEPHENS ELECTRONICS, INC

3513 PACIFIC AVENUE, BURBANK, CALIFORNIA 91505

PHONE: (213) 842-5116

SENSOR ALIGNMENT

For the following procedure, the operator should be knowledgeable about the use of an oscilloscope. Be sure to ground the scope to the chassis of the machine before starting the alignment procedure.

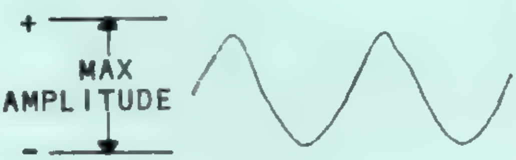
1. Remove head shield carriers to get access to sensors.

2. Center SYM and 90 SYM pots.

3. Connect scope to TP.6, and set for .02 volts/div., internal positive trigger.

4. Rotate BAL pot fully clockwise. With tape loaded, and deck in play mode, adjust Sensor 2 for maximum amplitude with minimum amplitude variation.

> WARNING: Use extreme caution when adjusting sensors not to hit the encoded disk. Hitting the disk with a screwdriver or the inner surface of the sensor can cause permanent damage to the disk.

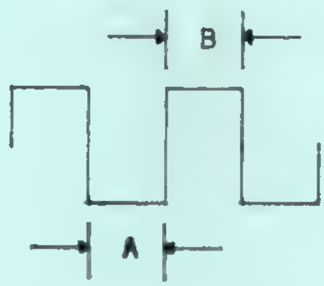


5. Rotate BAL pot fully counter clockwise. With the same above conditions, adjust Sensor 1 for maximum amplitude with minimum amplitude variation.
   When completed, both sensor assemblies should be pointing toward the center of the drum shaft.

6. Center BAL pot. Rotate Sensor 1 and BAL pot for minimum amplitude on scope. Increase gain of scope for accuracy if necessary. Deck may run wild.
   Do not readjust BAL pot for the rest of the alignment procedures.

7. Rotate Sensor 1 slightly for maximum amplitude with minimum amplitude variations.
This completes alignment of Sensors 1, 2 and the BAL pot.

8. Connect scope to TP 7. With deck in play mode adjust scope for display of square wave. Adjust SYM pot for symmetry of the square wave.



A=B

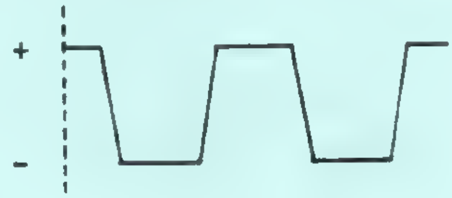
9. Connect scope to TP 5. Adjust scope for positive trigger. Reduce gain and adjust sweep for a display of four pulses. The first pulse should be at the start of the trace. Pulses two and three should be closely spaced together at the center of the screen with the fourth pulse at the far right side.

Adjust SYM pot so that pulse two is aligned on top of pulse three.
This completes alignment of the SYM pot.

10. Connect scope to TP 1. With deck in play mode, adjust scope to display waveform. Adjust Sensor 3 for maximum amplitude with minimum amplitude variation. Adjust 90 SYM pot for symmetry of waveform.

11. Connect external trigger of scope to TP 2. With deck in play mode, switch scope to external positive trigger. Adjust trigger for a stable pattern.

12. Rotate Sensor 3 so that the scope trace starts with half of the positive portion of the square wave.



13. Run deck in rewind mode. The left side of the scope trace should now start with the negative portion of the square wave. If the slope of the square wave shows at the start of the trace, readjust Sensor 3. For better clarity of waveform, increase scope sweep speed.

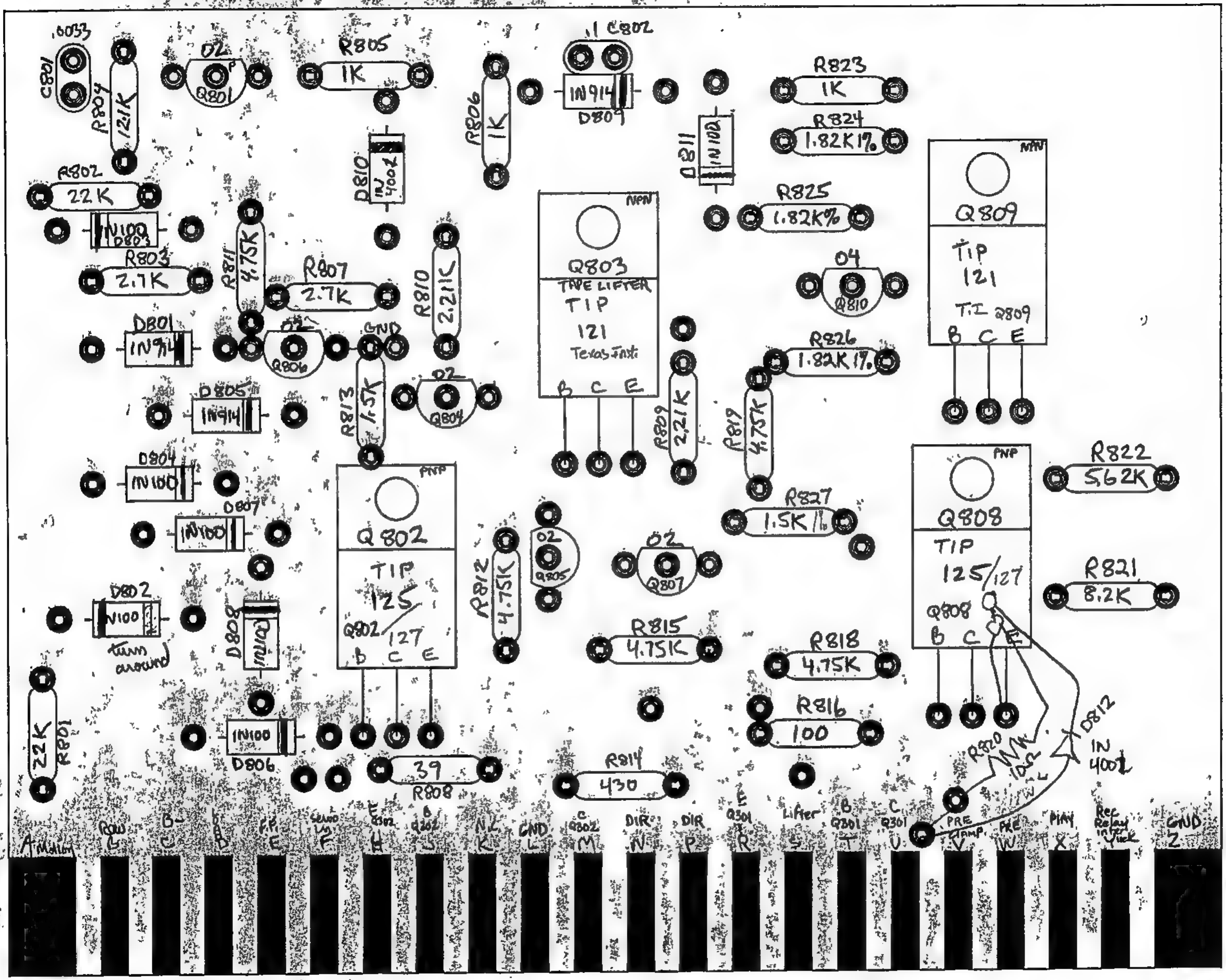
14. Run deck in fast forward mode. Trace should start with the positive portion of the square wave during acceleration and deceleration. If the slope of the square wave shows at the start of the trace, readjust Sensor 3.

Sensor alignment is complete when, with deck operating at any shuttle speed in either direction, scope trace starts with no slope showing.

11-17-79 JFS

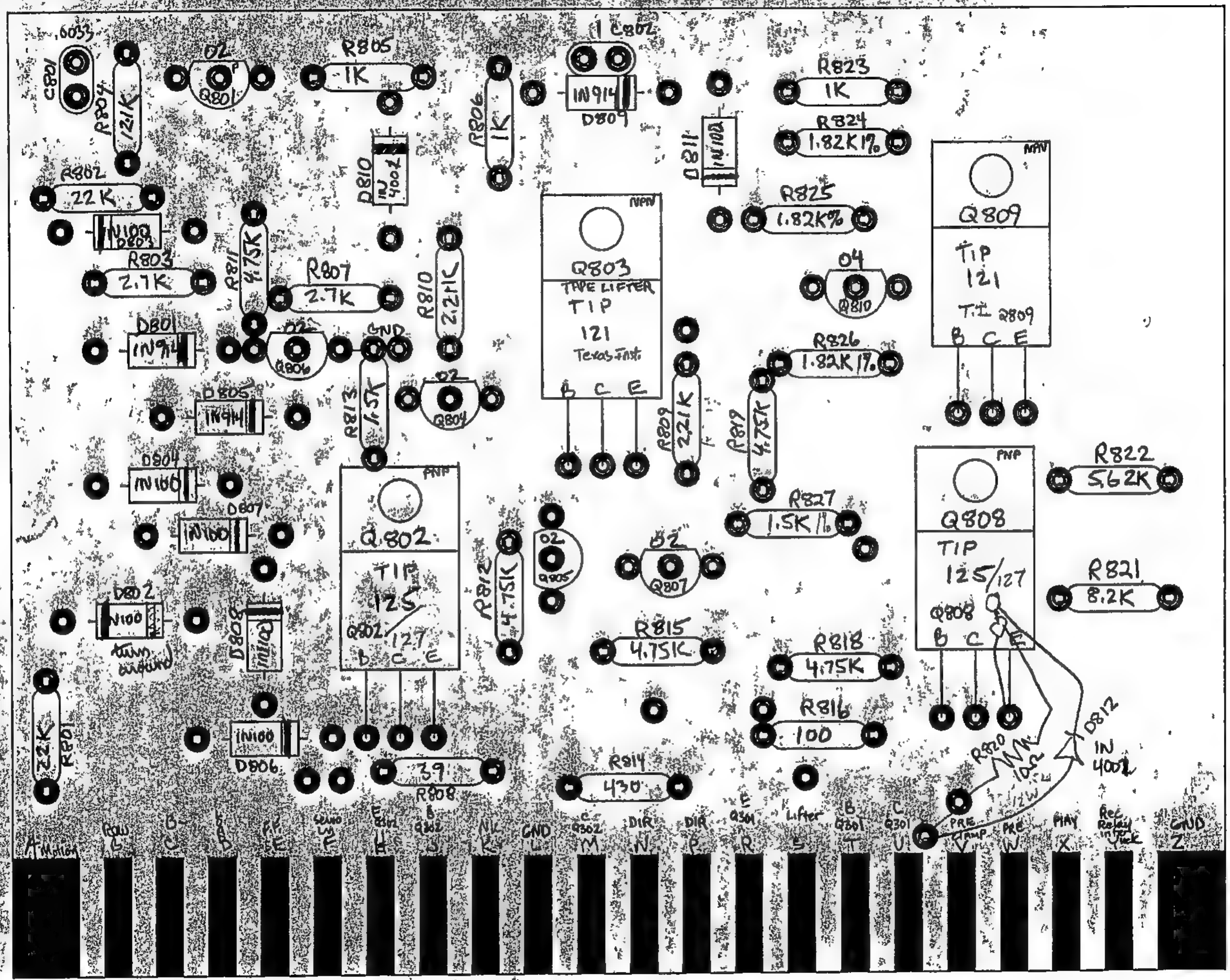
3702 = PNP
3704 = NPN

SERVO



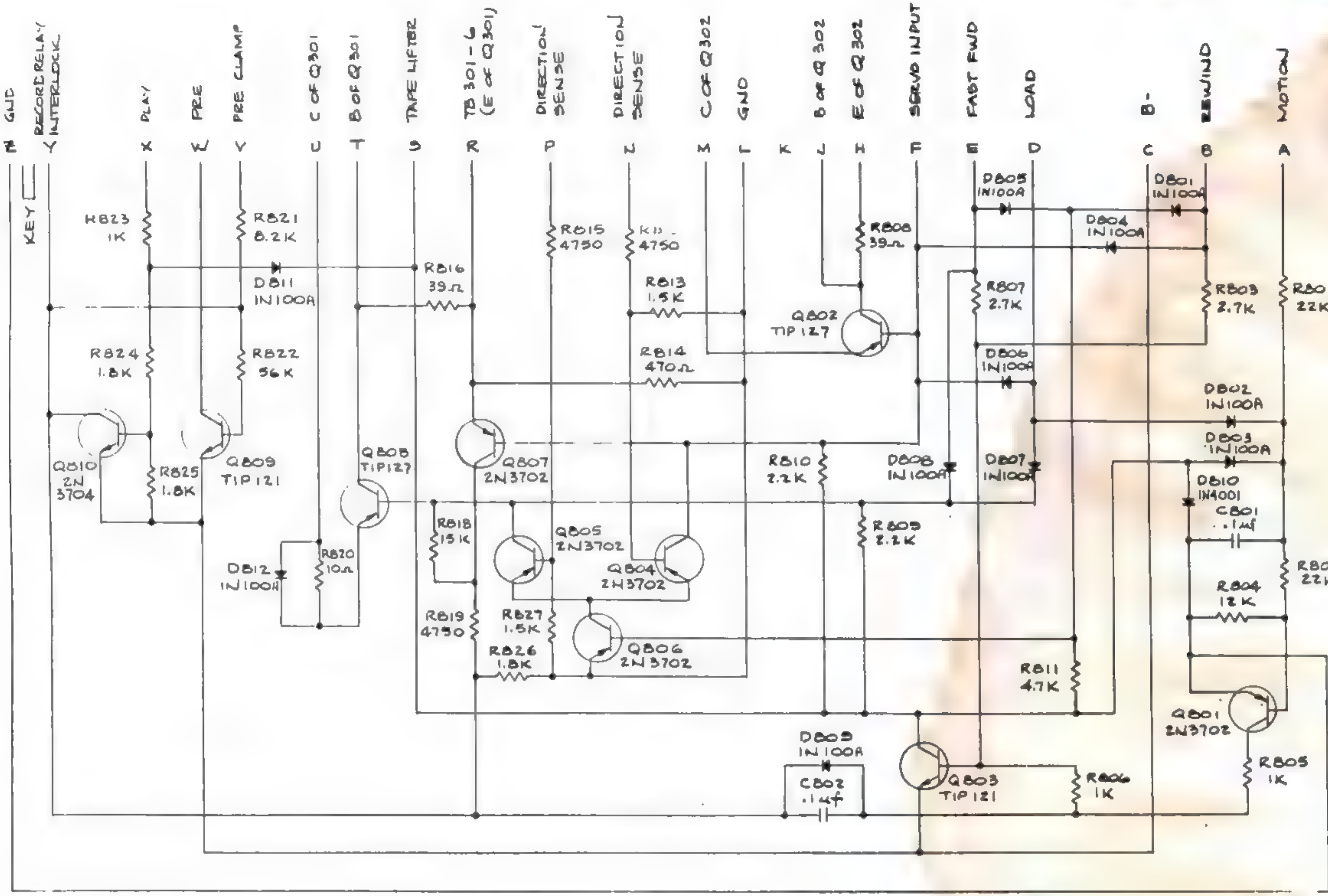
5702 - PNP
5704 - NPN

SERVO



A Motion
B Rew
C B-
D B-
E F.F.
F Servo Lin
H E Q301
J B Q302
K NK
L GND
M C Q302
N DIR
P DIR
R E Q301
S Lifter
T B Q301
U C Q301
V PRE AMP
W PRE
X PLAY
Y Rec Relay in Trick
Z GND

LTR	DESCRIPTION	
A	C801 WAS .0G.	MODEL WAS 8219



ALL CAPACITORS 50VOLT AND IN MICROFARADS
ALL RESISTORS 1/4 WATT

LAST SYM NO. USED	NOS. OMITTED
C802	
D812	
Q810	
R827	R817

STEPHENS ELECTRONICS, INC.

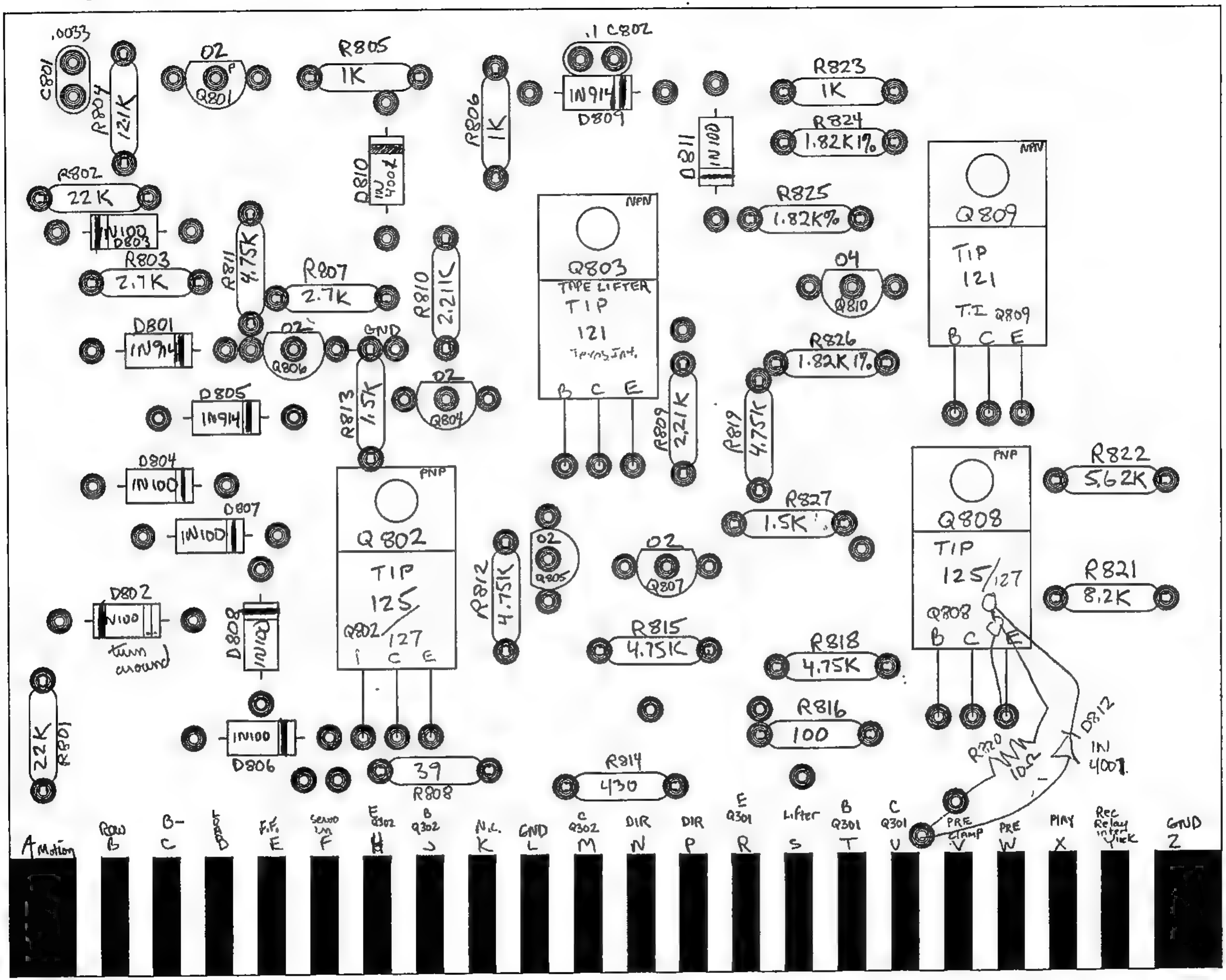
SCALE: ~	APPROVED BY:	DRAWN BY GEIGER
DATE: 5 JUL 78		REVISED

SERVO CARD - 310163 A

MODELS		DRAWING NUMBER
103A - 104A	FIGURE 6-12	SC-0801A

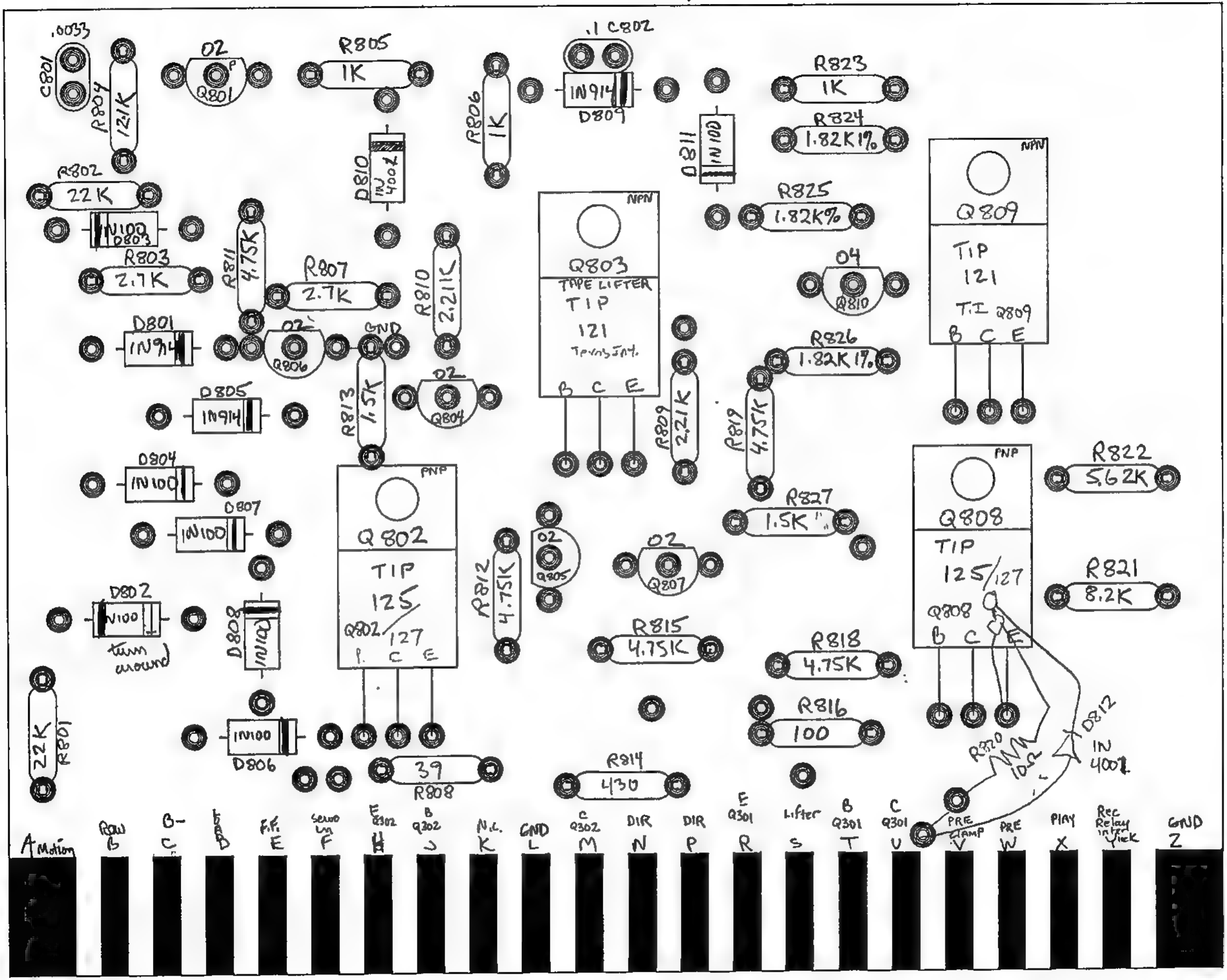
3707 - PNP
3704 - NPN

SERVO



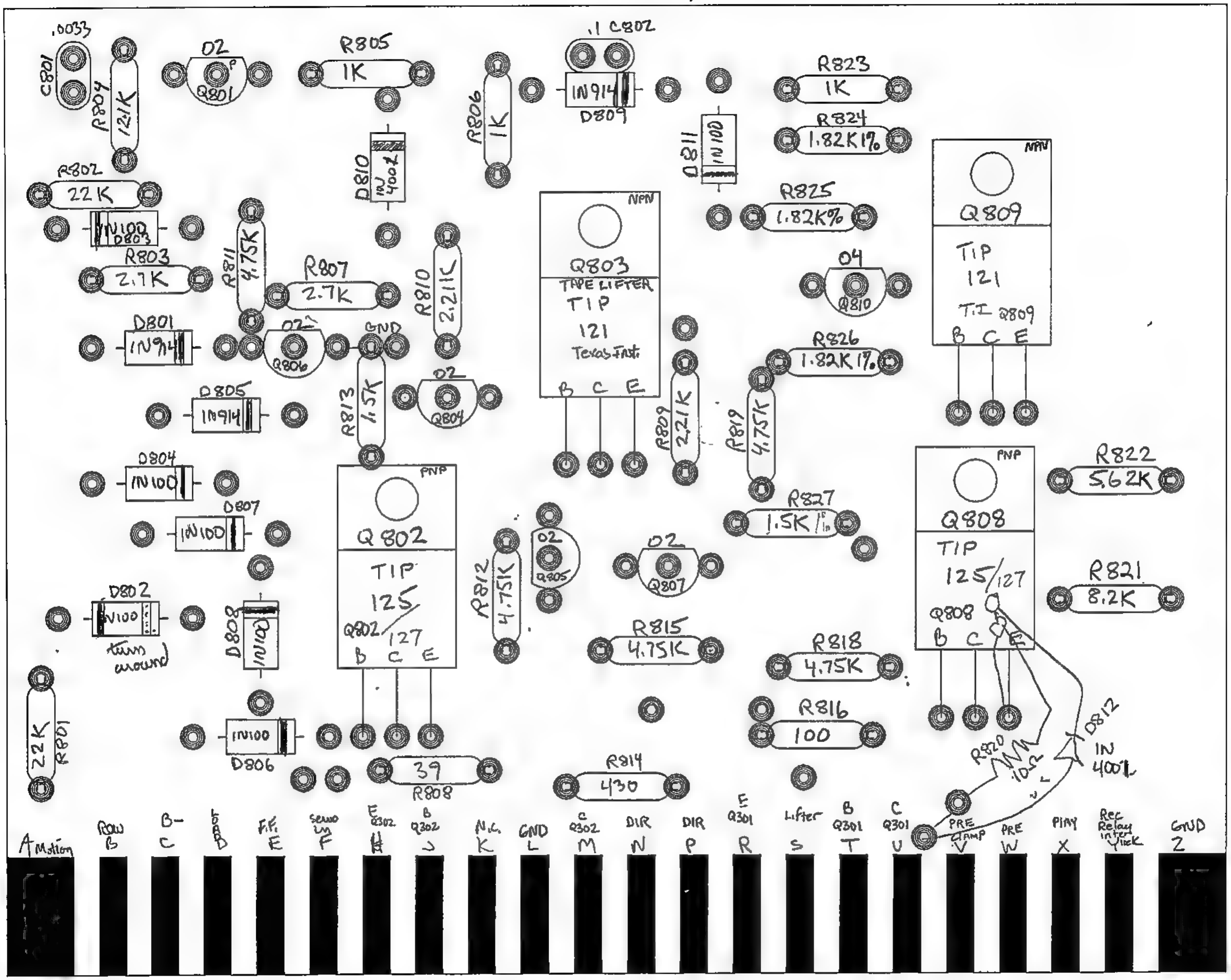
3707 - PNP
3704 - NPN

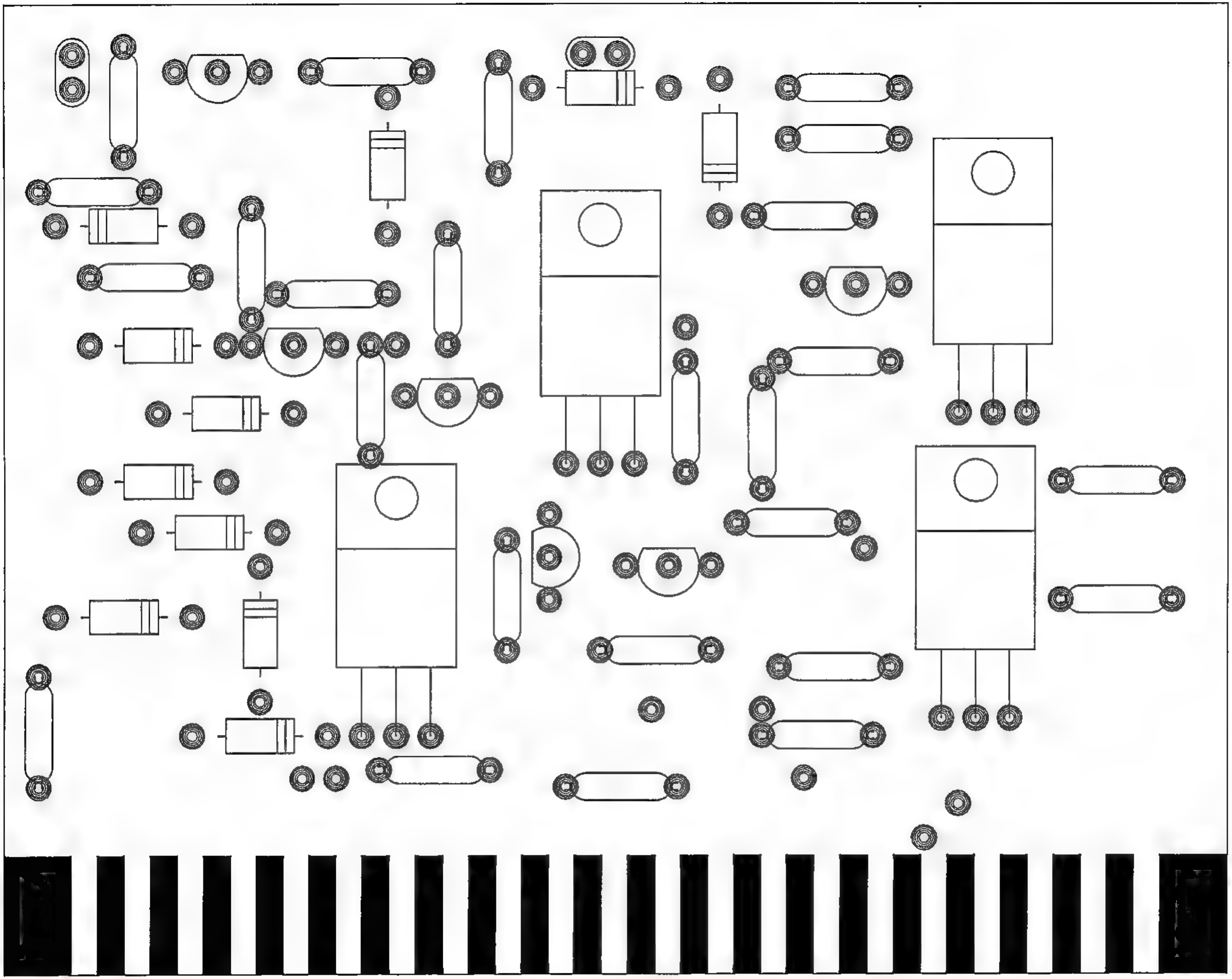
SERVO



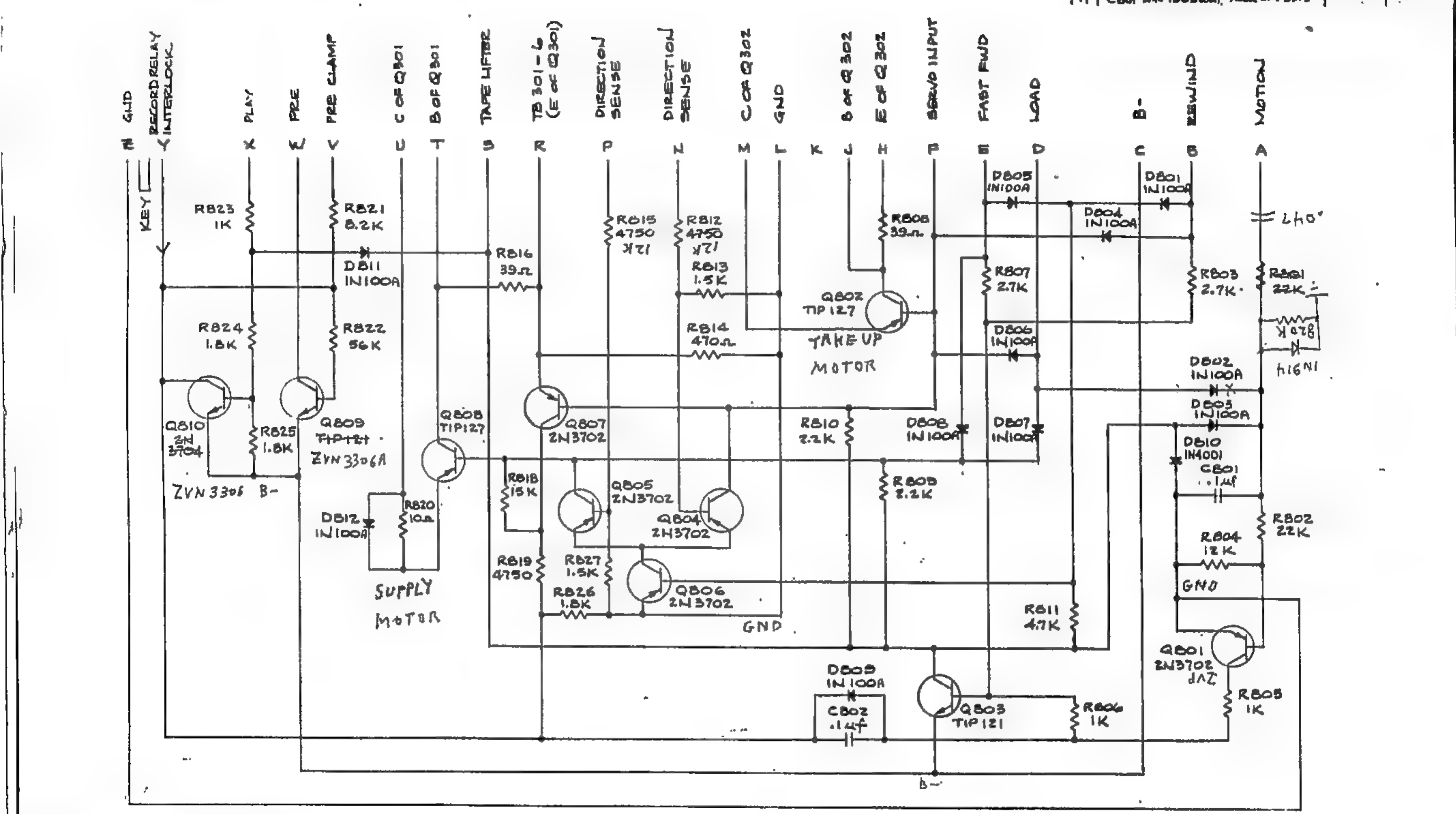
3702 - PNP
3704 - NPN

SERVO

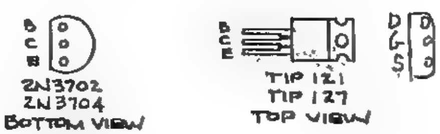




REVISIONS			
LTR	DESCRIPTION	DATE	BY
A	C801 WAS .0033uf, MODEL WAS 8818	1-23-81	[illegible]



ALL CAPACITORS 50 VOLT AND IN MICROFARADS
ALL RESISTORS 1/4 WATT



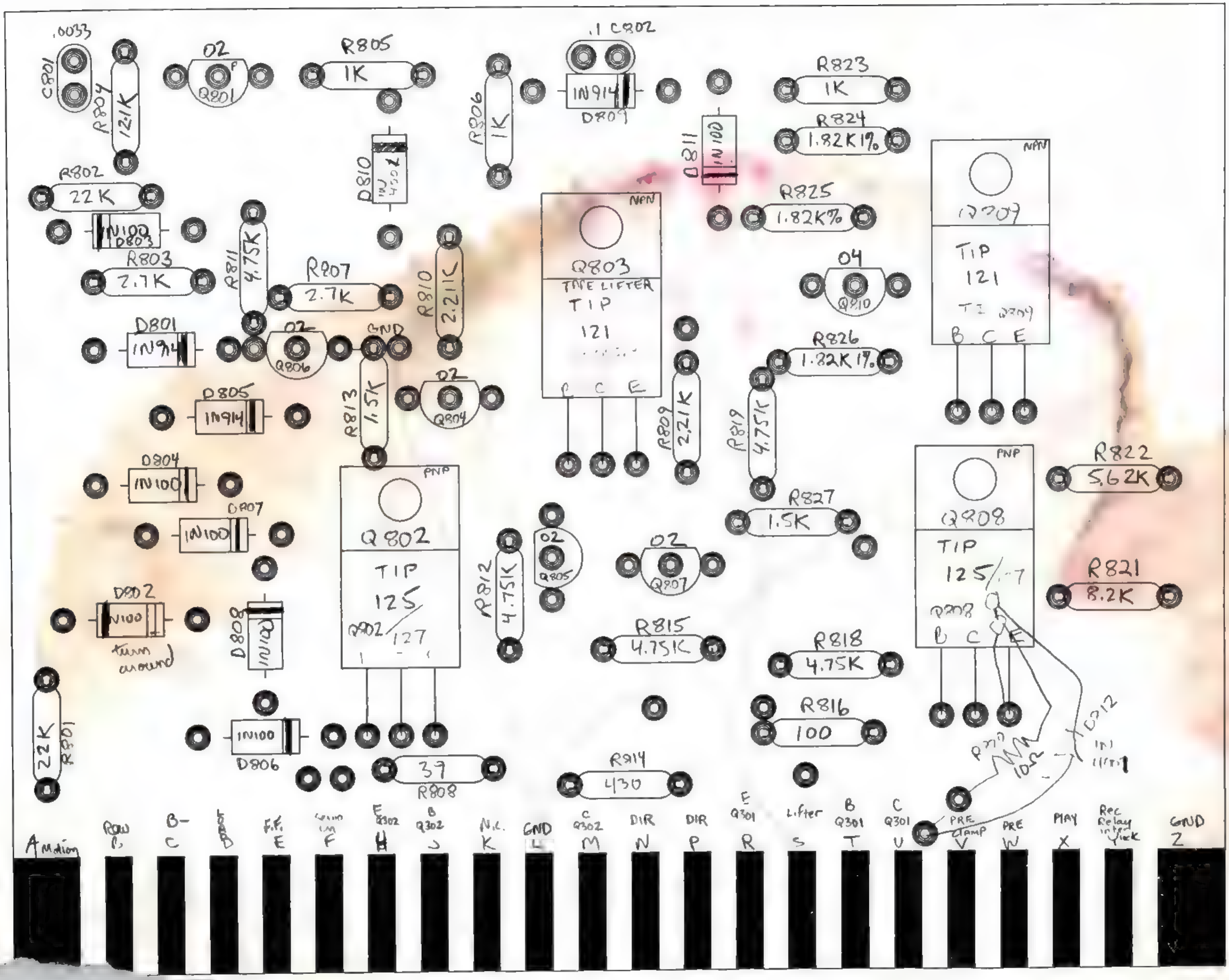
LAST SYM NO. USED	NOS. OMITTED
C 802	
D 812	
Q 810	
R 827	R817

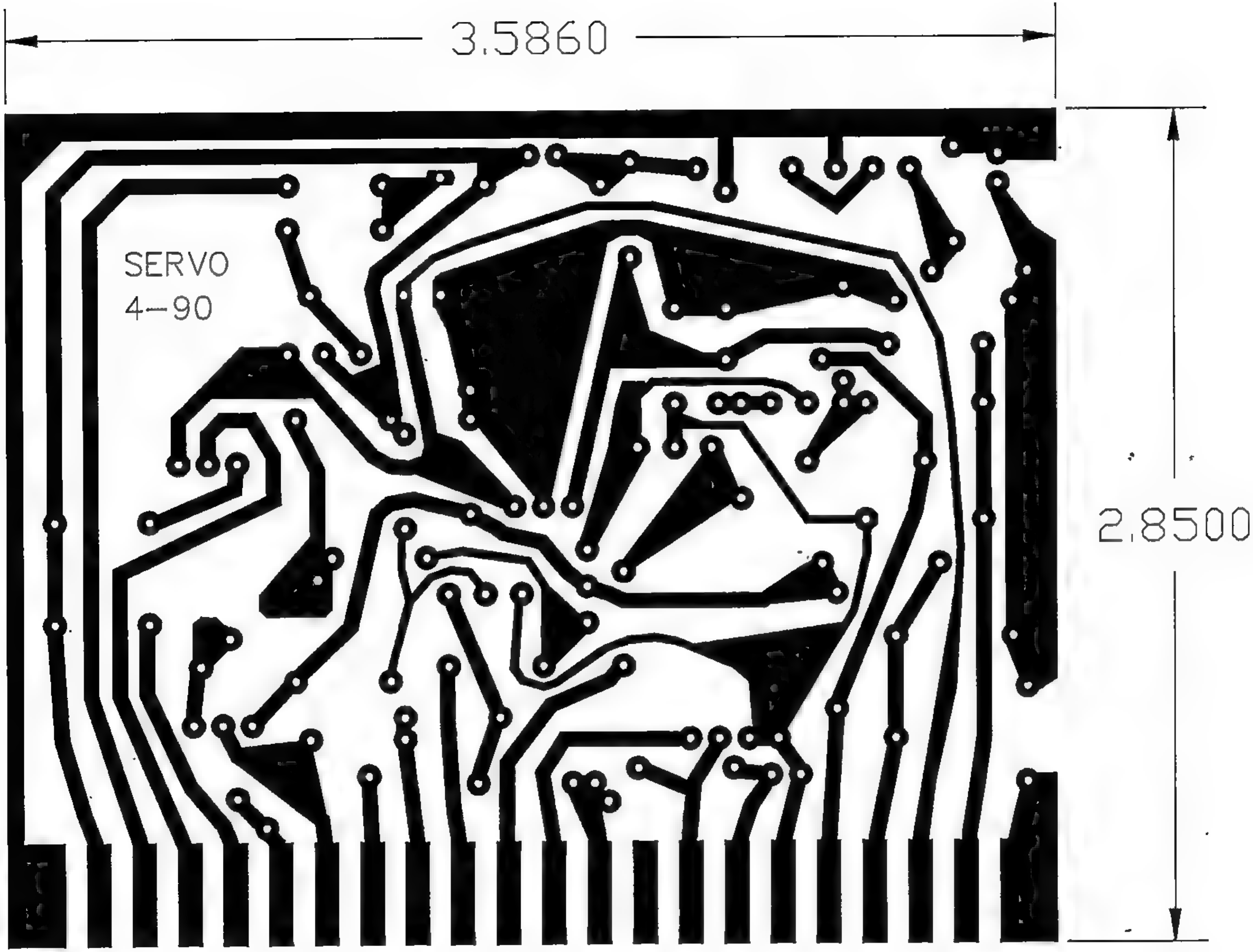
STEPHENS ELECTRONICS, INC.

SCALE:	APPROVED BY:	DRAWN BY GEIER
DATE: 3 JUL 78		REVISED
SERVO CARD - 310163 A		
MODELS 103A-104A	FIGURE 6-12	DRAWING NUMBER SC-0801A

3702 - PNP
3704 - NPN

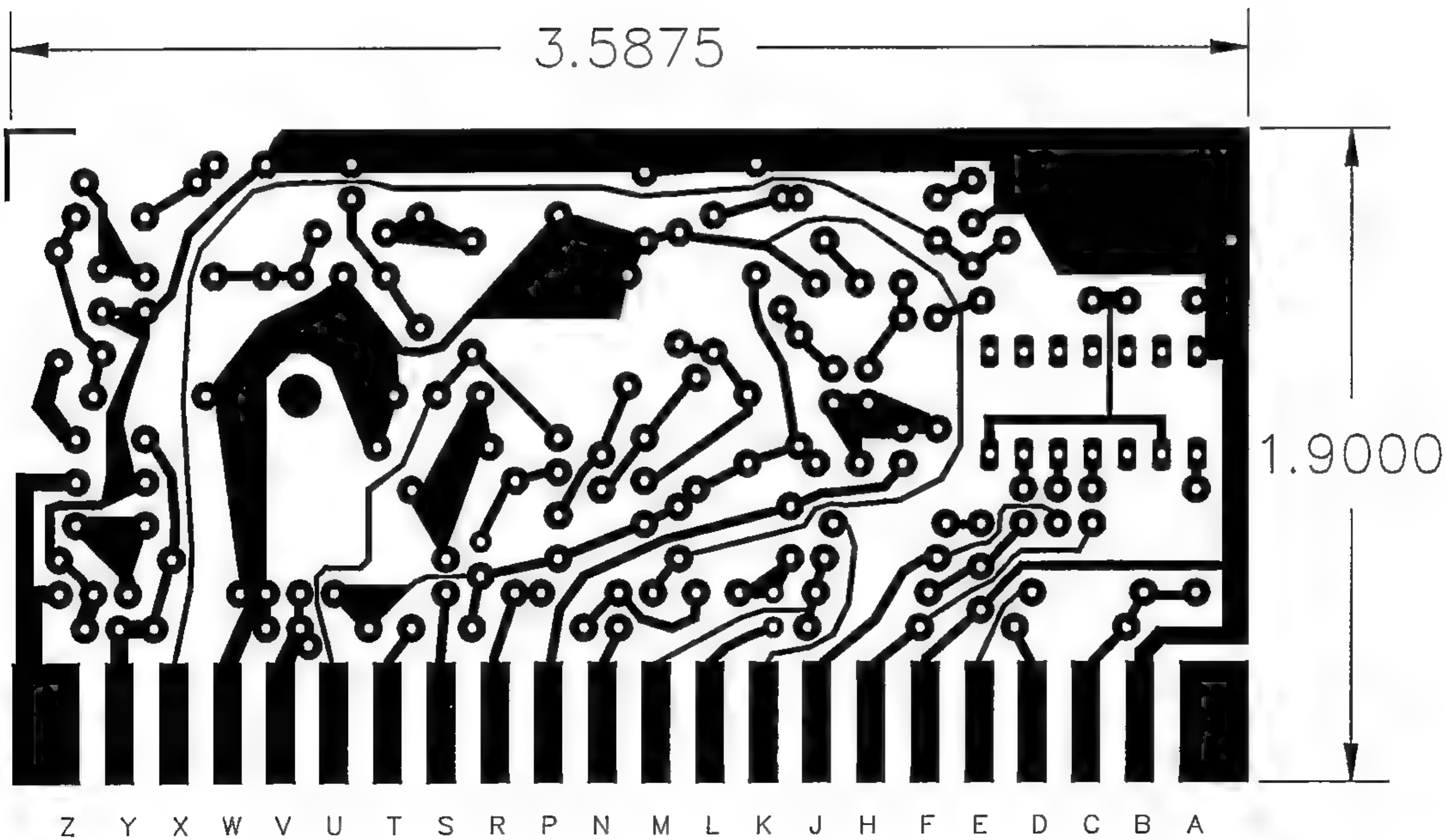
S2F17





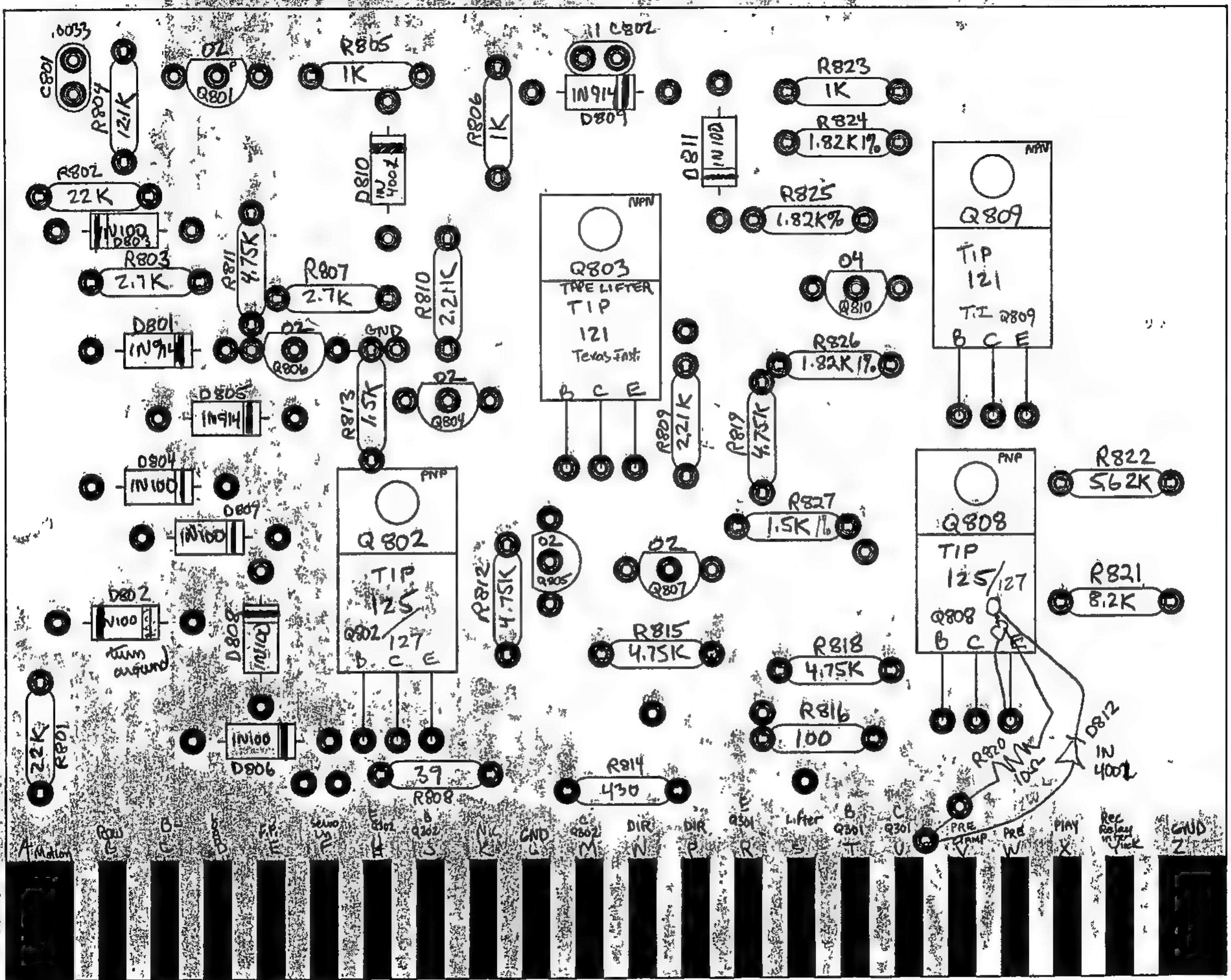
SERVO PCB
SOLDER SIDE

SOLDERSIDE



3702 = PNP
3704 = NPN

SERVO



STEPHENS
ELECTRONICS, INC.
3513 PACIFIC AVENUE
BURBANK, CALIF. 91505
PHONE: (213) 842-5116

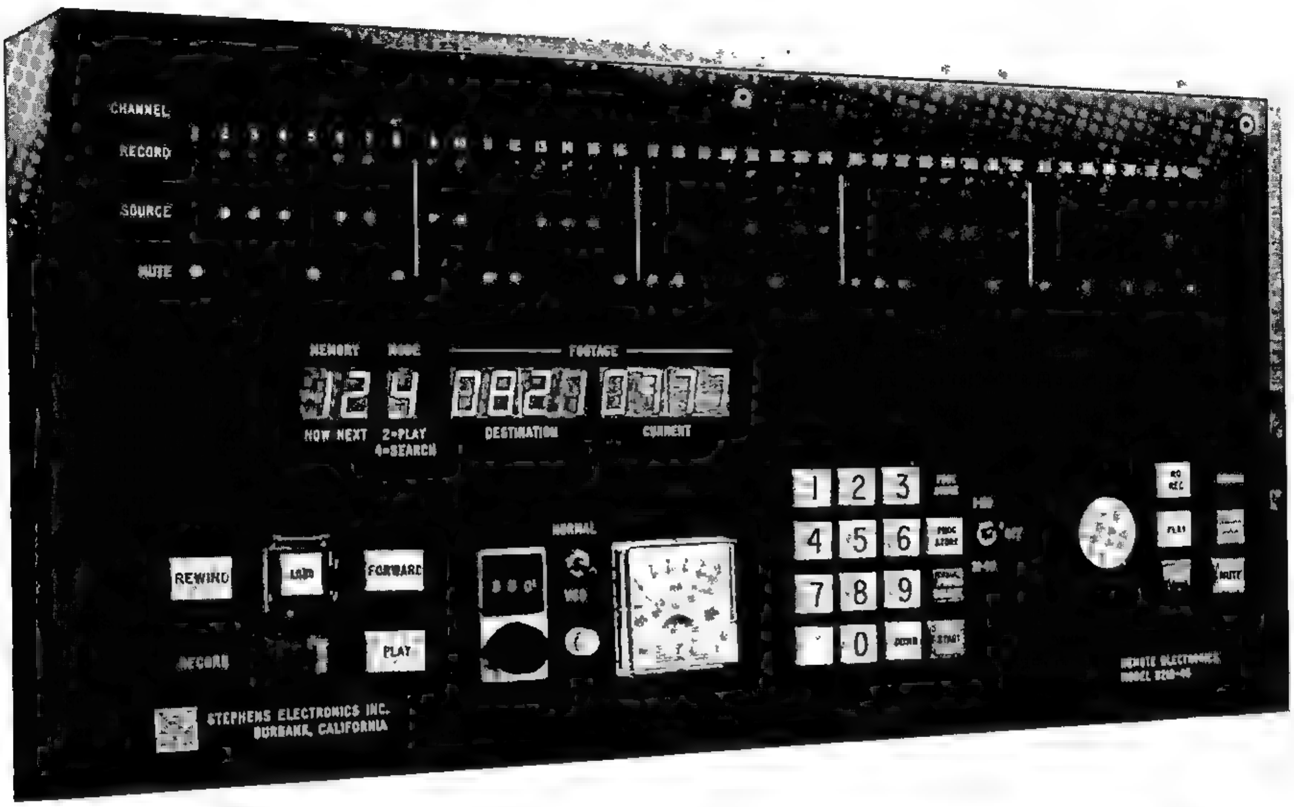
AUTOMATIC TAPE LOCATOR

Stephens Electronics, Inc., Burbank, California, proudly presents their new automatic tape locator. The microprocessor control system enables the operator to store and display ten cue locations via the high quality keyboard. Control functions consist of the following:

1. Program storage, which loads into memory the destination, as well as mode selection; stop, play or search, and also the number of the next program to be processed.
2. Footstore, which enters any desired location into the machine's current footage.
3. Program select, which will display and currently process any stored footage.
4. "Dumb", which loads the tape's current location into destination memory and returns the tape to this cue.
5. Start, which initiates auto locator control.

Therefore, the storage of mode and next program data, permits this amazing device to cycle automatically to the next program when tape footage equals the desired destination. Manual control negates start and is actuated by any of the machine's motion switches. In manual control, the locator displays tape footage and stores any cue by pressing "dumb" button. The locator has an eleven digit LED readout and is available as a hand held unit (14cm x 19.5cm), or in the complete 24-track remote electronics package (18.75cm x 36.5cm).

The Stephens Q-II Autolocator.



The inherent simplicity of the Stephens transport has enabled the design of a fully automatic tape locator. Our microprocessor controlled system permits you to store and recall up to ten commands. Instructions are entered via a high quality keyboard and controls are distinguished by illuminated buttons. Information is read from an eleven digit LED display. Maximum shuttle speed is maintained within feet of the desired location, at which time the ramp braking system takes over and stops with no overshoot.

Instructions are easy to enter, simply do the following. First push the PROGRAM STORE button and enter a program number from one to nine which you have assigned to identify the instruction. Select a program number that you will use to identify the next set of instructions that you will enter—instructions do not have to be in numerical sequence. Next, select the mode you will be operating in for your instruction—push "2" for play or "4" for search. Enter a four digit footage location where the current instruction ends and the autolocator cycles automatically to the next instruction. Now push START and the locator will take control.

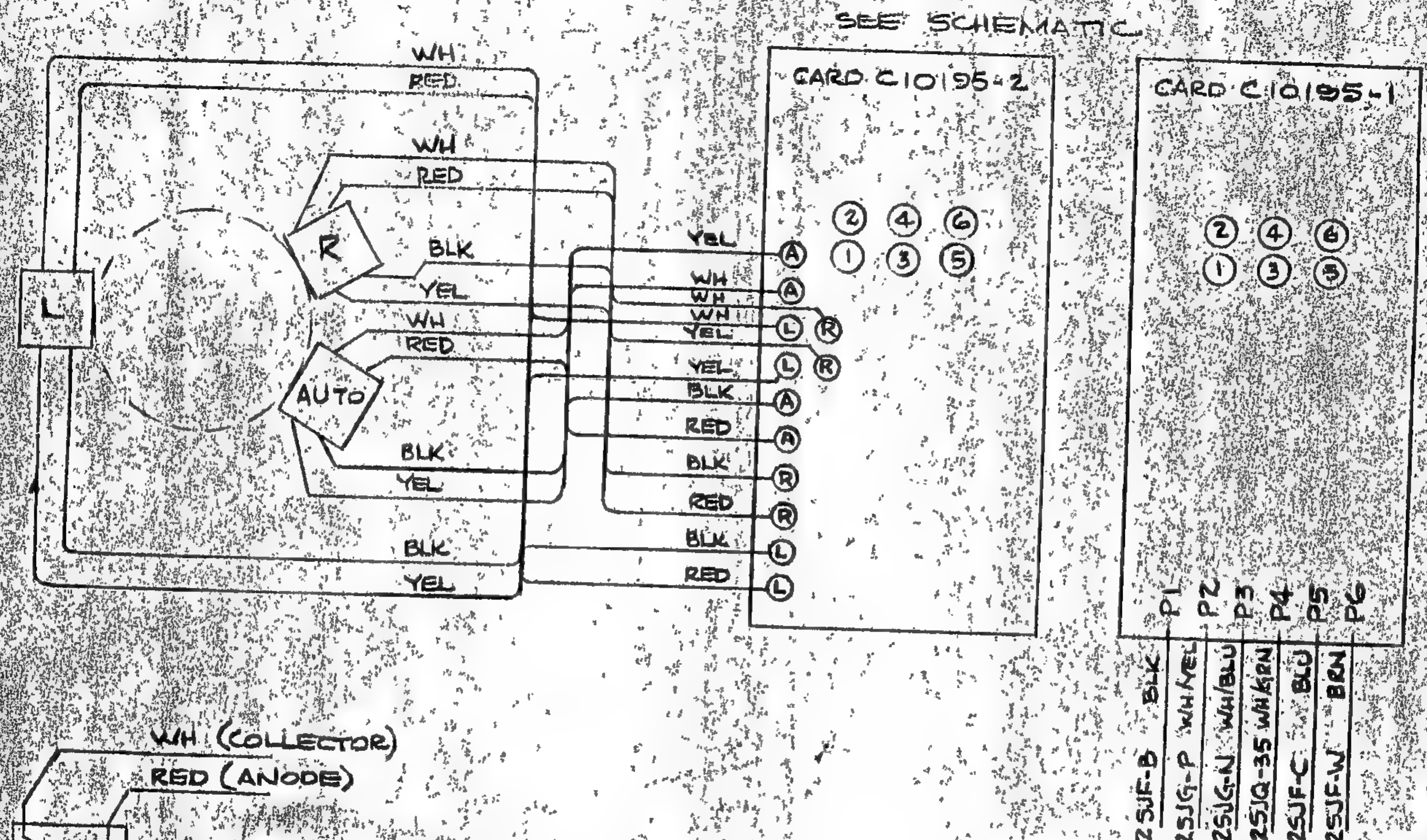
Manual control of your Stephens recorder/reproducer can be regained at any time by pushing STOP or REWIND. In manual control, the locator is there to assist by displaying tape footage, and can store any cue location when the DUMB button is pressed. The DUMB button stores that footage count in memory, and it can be recalled at any time simply by pressing the PROGRAM SELECT button and entering a zero. This is most convenient for marking a spot that you want to work on later.

Our microprocessor based system can cycle thru ten separate commands in whatever order is desired, or as few as two commands over and over again. The advantages are obvious.

The Stephens Q-II autolocator comes standard with 15 feet of cable. It is available as a separate unit, or incorporated with deck-shuttle controls, or with the complete remote electronics package seen pictured above. For convenience multiple displays may be ordered.

STEPHENS ELECTRONICS, INC

Since 1956 3513 Pacific Avenue, Burbank, Calif. 91505 • Phone (213) 842-5116



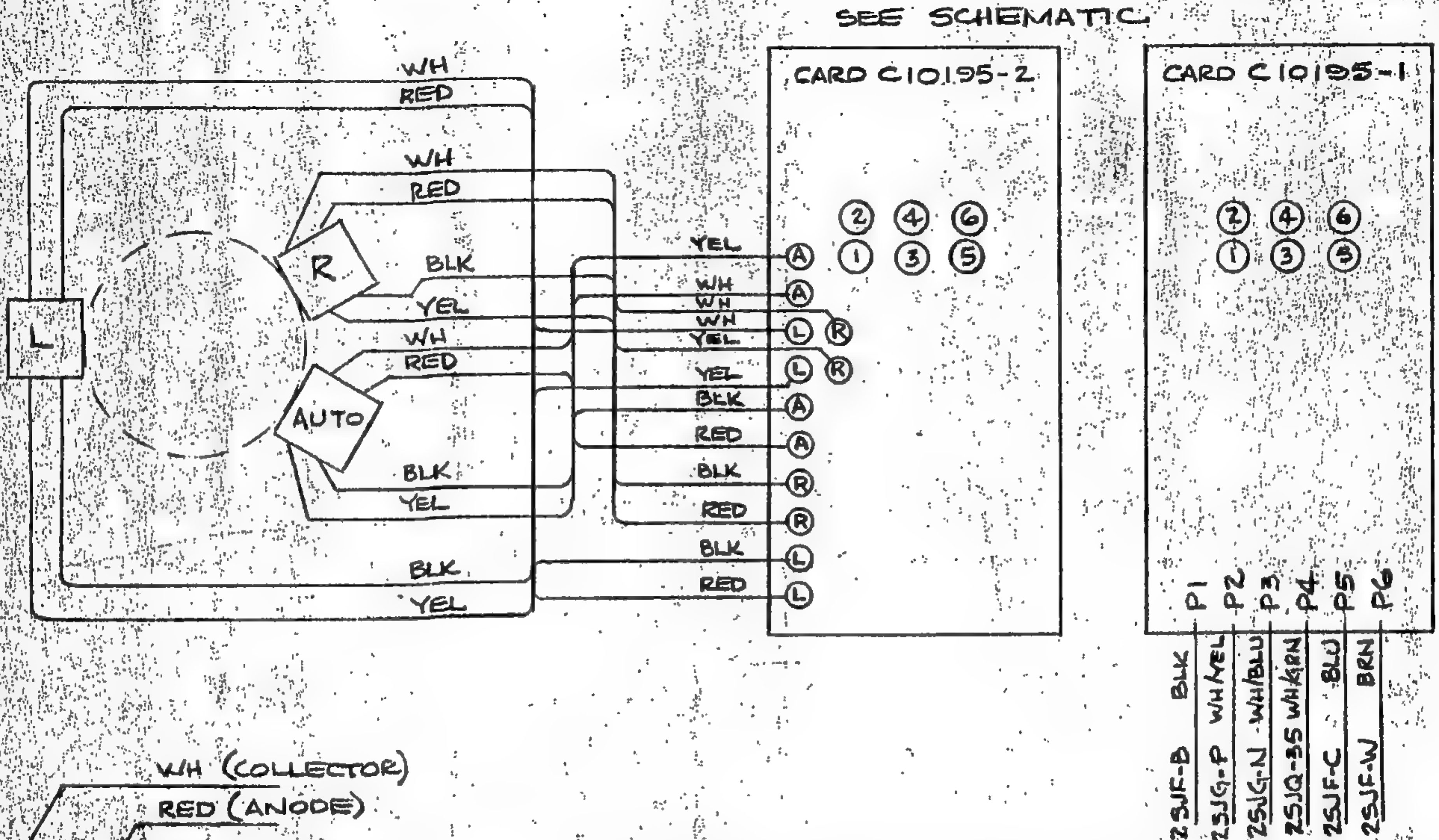
STEPHENS ELECTRONICS, INC.

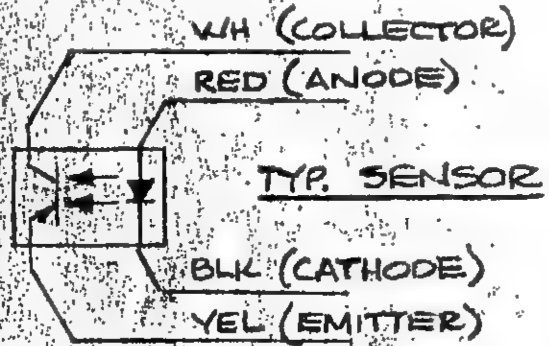
SCALE:	APPROVED BY:	DRAWN BY GEIER
DATE:		REVISED

INTERCONNECTION DIAGRAM
SENSOR INTERFACE

MODEL 821 B-24-QII

DRAWING NUMBER





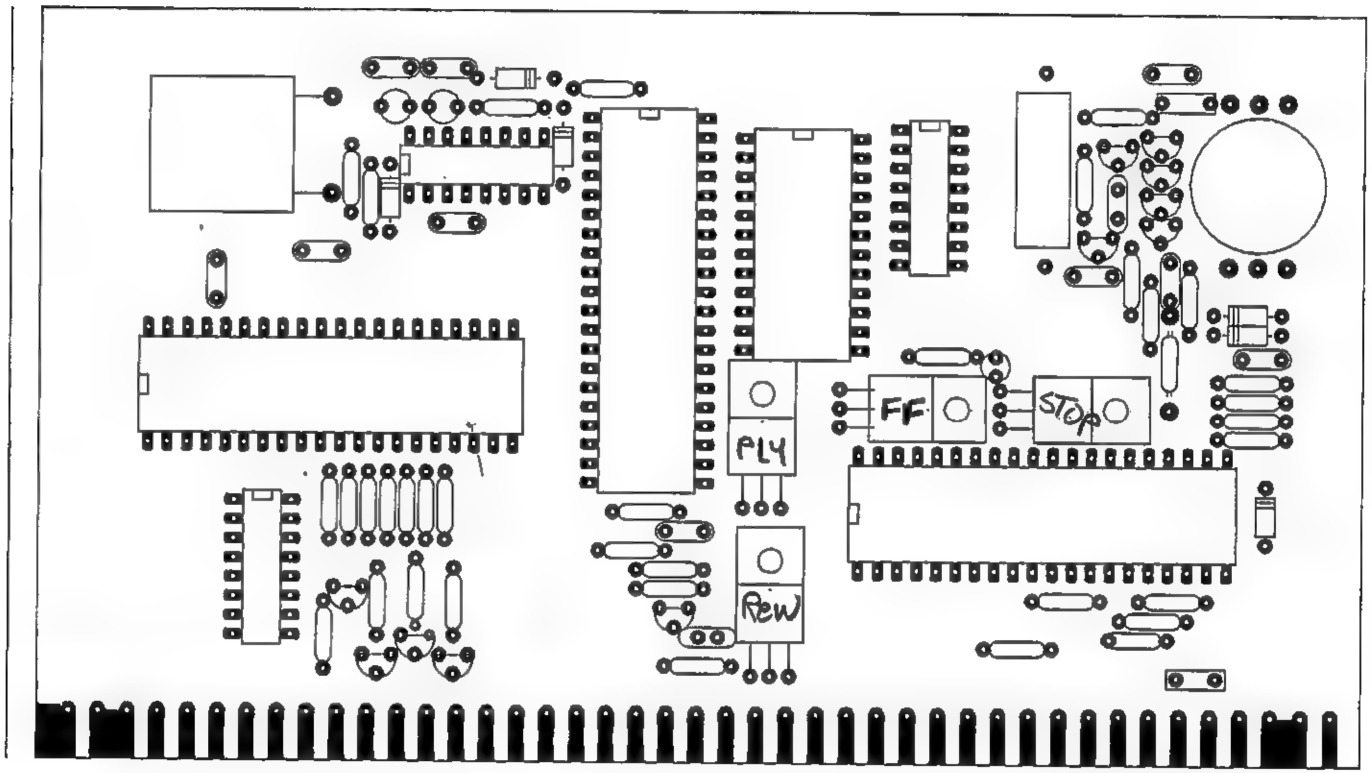
STEPHENS ELECTRONICS, INC.

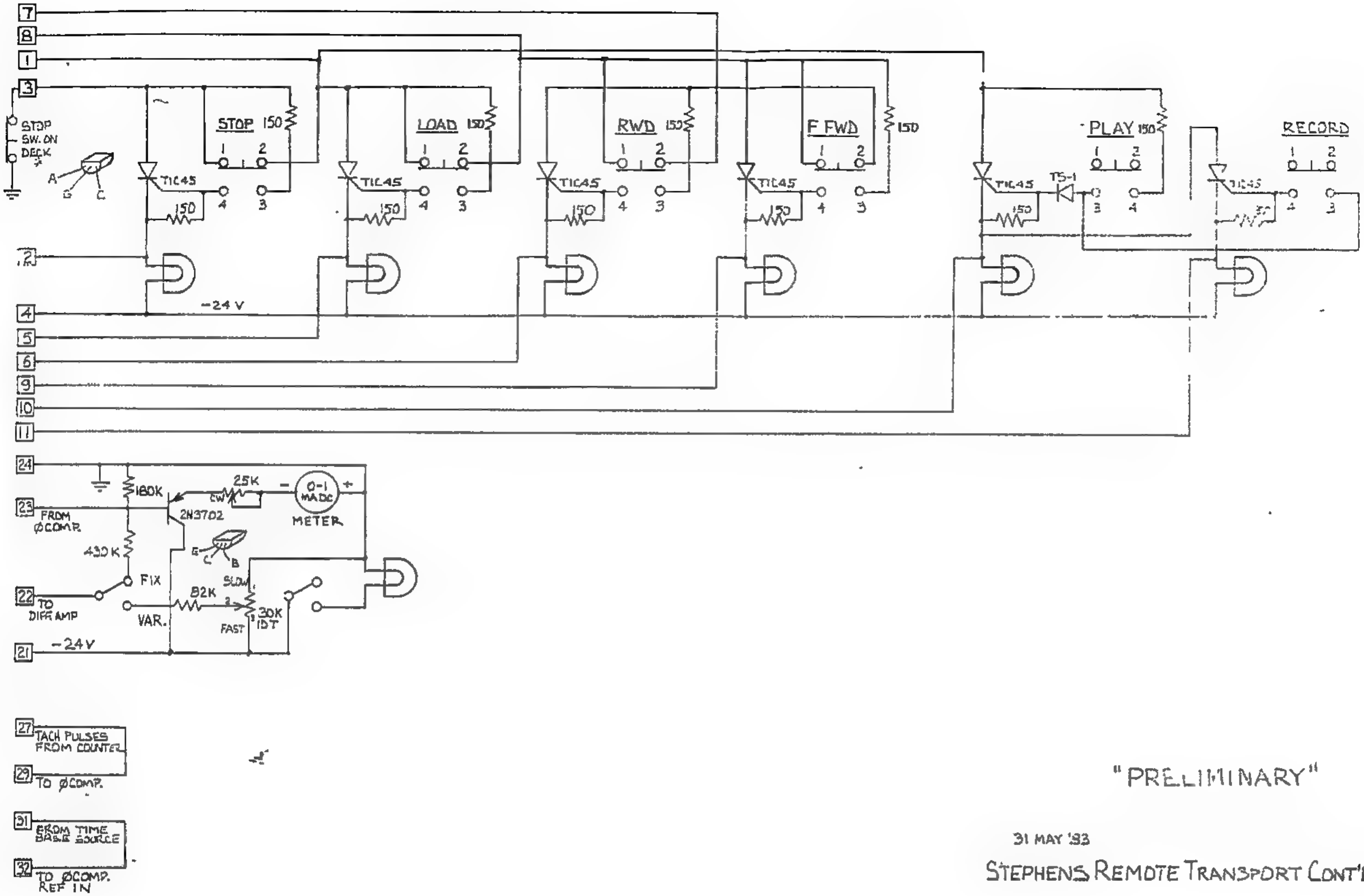
SCALE: ~	APPROVED BY:	DRAWN BY GEIER
DATE:		REVISED

INTERCONNECTION DIAGRAM
SENSOR INTERFACE

MODEL 821 B-24-QII

DRAWING NUMBER

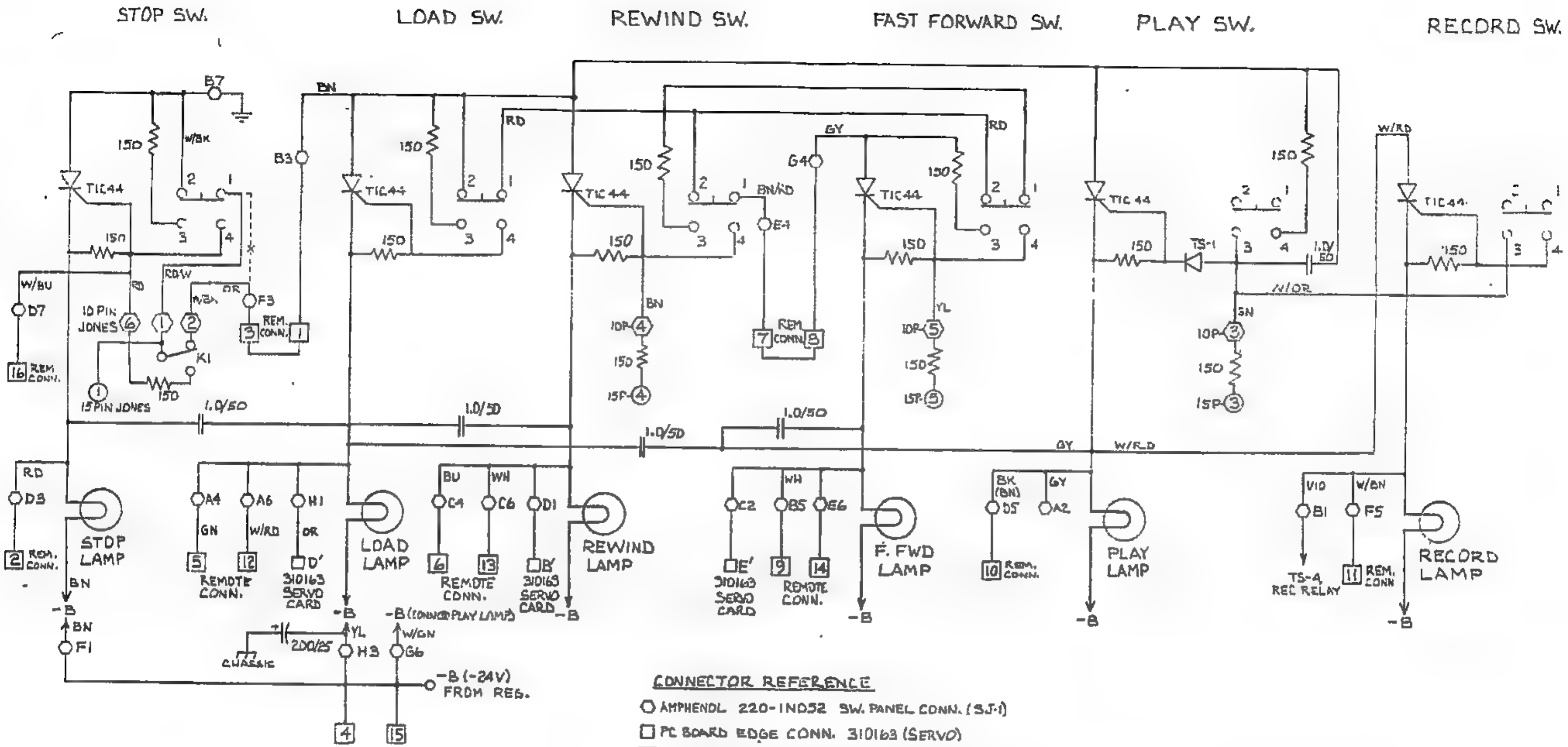

FF
STOP
PLY
Rew



"PRELIMINARY"

31 MAY '83

STEPHENS REMOTE TRANSPORT CONT'L. SCHEMATIC



CONNECTOR REFERENCE

- AMPHENOL 220-1ND52 SW. PANEL CONN. (SJ-1)
- PC BOARD EDGE CONN. 310163 (SERVO)
- AMPHENOL 57-X0360 REMOTE CONN.
- 10 PIN 'JONES' (RSC MOD. FOR ADAMS-SMITH)
- 15 PIN 'JONES' (RSC MOD. FOR ADAMS-SMITH)

"PRELIMINARY"

31 MAY '83

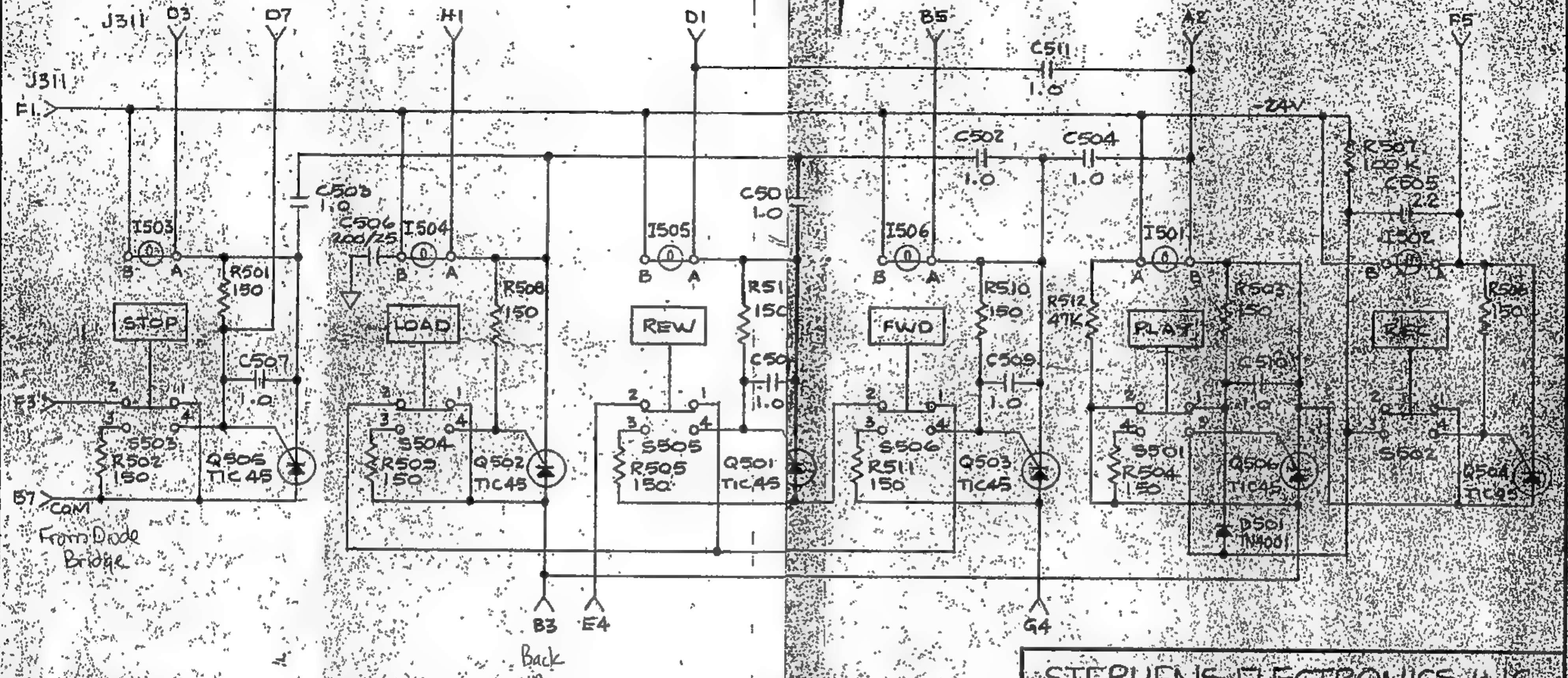
STEPHENS TRANSPORT CONT'L. DETAIL SCHEMATIC DIAG.

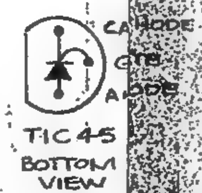
SUPPLEMENT TO TAPE TRANSPORT SCHEMATIC

NOTE: USES RSC (RESISTOR-SCR-CAPACITOR) LOGIC.

ALL RESISTORS 1/4 WATT
ALL CAPACITORS 50 VOLT AND IN MICROFARRADS

REVISIONS			
LTR	DESCRIPTION	DATE	BY



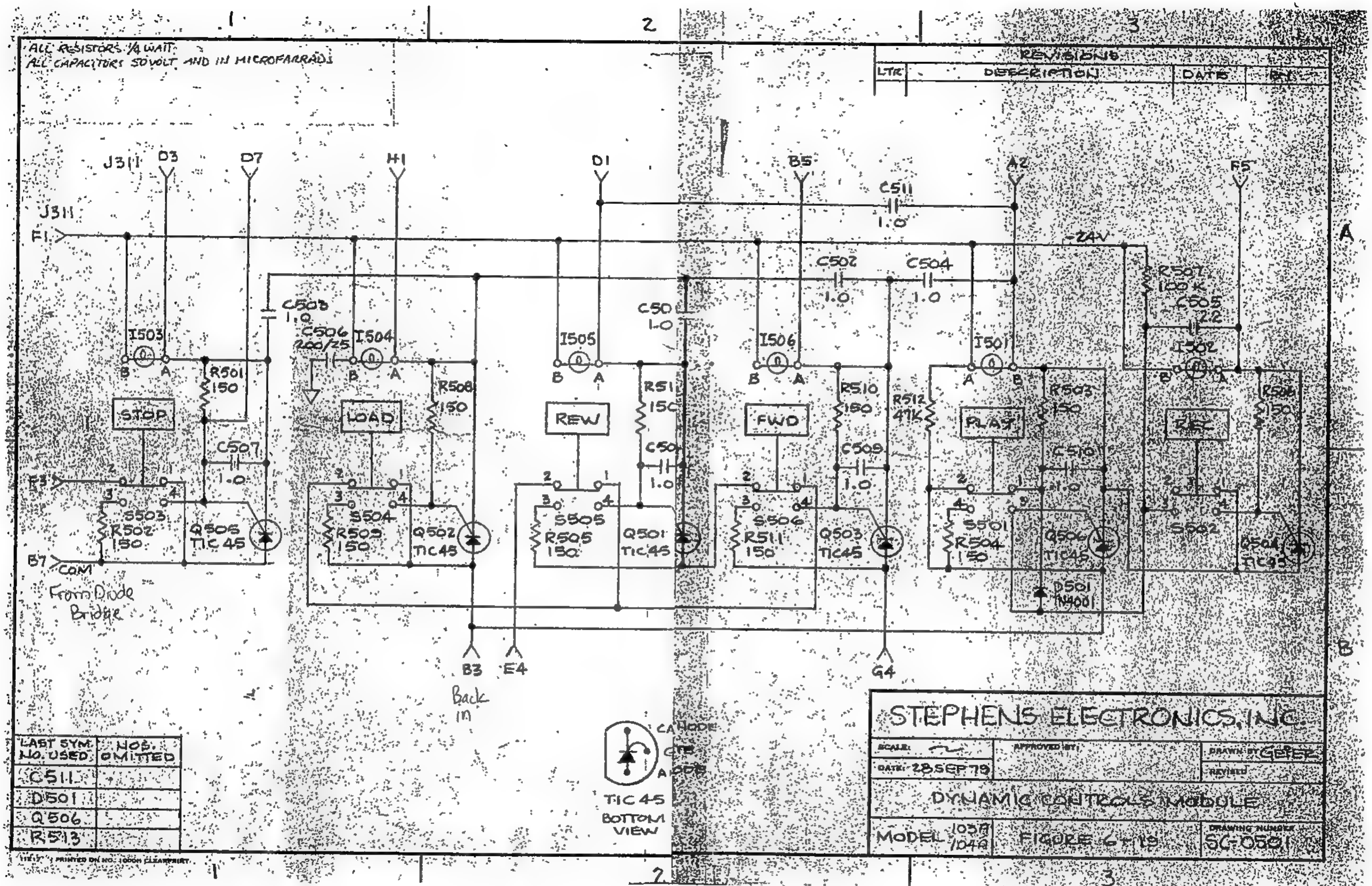


TIC45 BOTTOM VIEW

LAST SYM. NO. USED	NOS. OMITTED
C511	
D501	
Q506	
R513	

STEPHENS ELECTRONICS, INC.

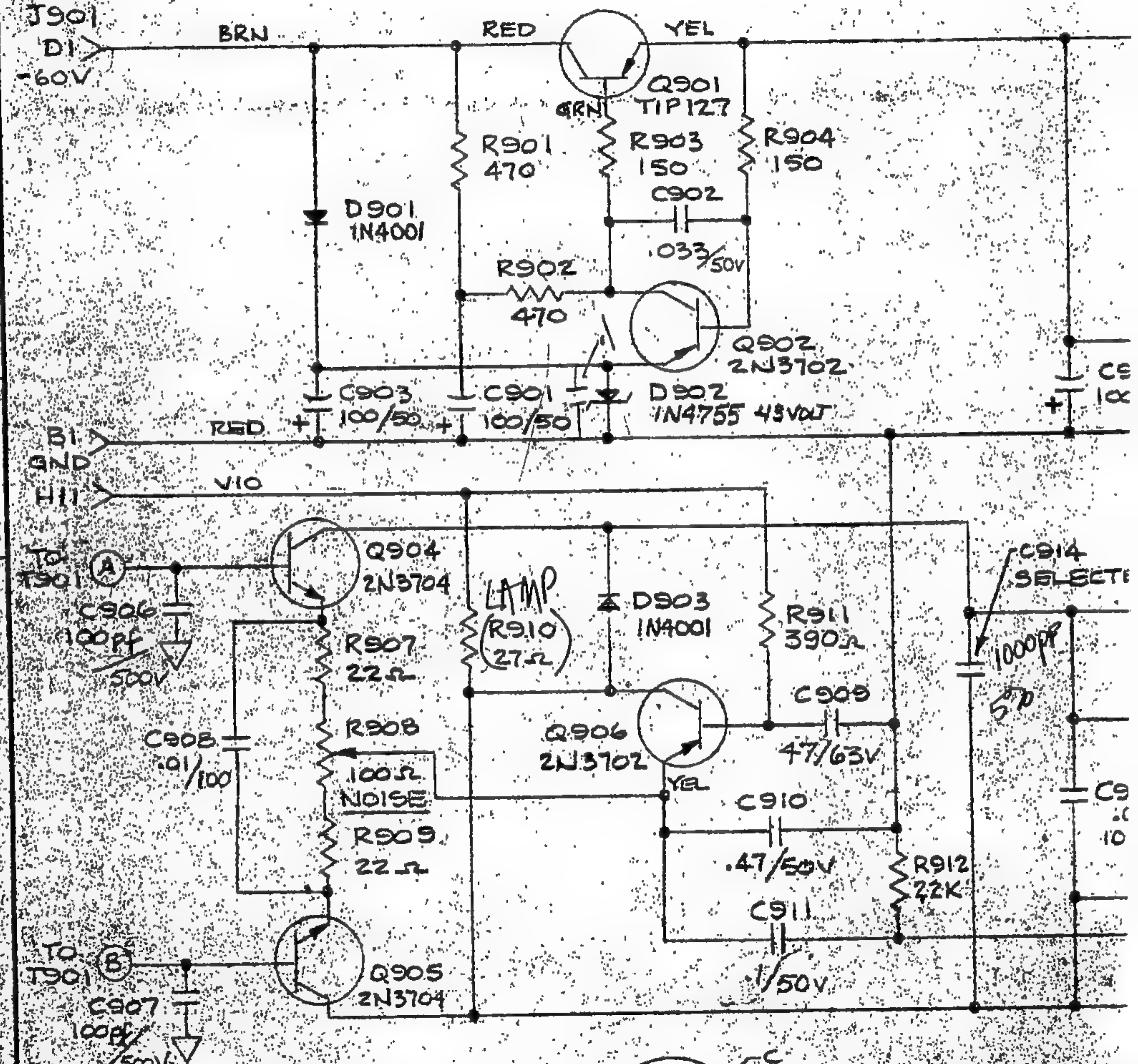
SCALE: —	APPROVED BY:	DRAWN BY: GEISE
DATE: 28 SEP 79		REVISED
DYNAMIC CONTROLS MODULE		
MODEL 105A/104A	FIGURE 6-19	DRAWING NUMBER SC-0501


ALL RESISTORS 1/4 WATT
ALL CAPACITORS 50 VOLT AND IN MICROFARRADS
REVISIONS
LTR
DESCRIPTION
DATE
BY
J311
D3
D7
H1
D1
B5
A2
F5
F1
-24V
C511
1.0
C502
1.0
C504
1.0
C503
1.0
C506
200/25
C501
1.0
R507
100K
C505
2.2
I503
I504
I505
I506
I501
I502
R501
150
R508
150
R511
150
R510
150
R512
47K
R503
150
R506
150
STOP
LOAD
REW
FWD
PLAY
REC
C507
1.0
C508
1.0
C509
1.0
C510
1.0
S503
S504
S505
S506
S501
S502
R502
150
R509
150
R505
150
R511
150
R504
150
Q505
TIC 45
Q502
TIC45
Q501
TIC45
Q503
TIC45
Q506
TIC45
Q504
TIC45
D501
IN4001
F3
B7
COM
From Diode Bridge
B3
E4
G4
Back in
CATHODE
GATE
ANODE
TIC 45
BOTTOM VIEW
STEPHENS ELECTRONICS, INC.
SCALE:
DATE: 28 SEP 79
APPROVED BY:
DRAWN BY GEIER
REVISED
DYNAMIC CONTROLS MODULE
MODEL 1037 / 1040
FIGURE 6-19
DRAWING NUMBER
SC-0501
LAST SYM. NO. USED
NOS. OMITTED
C511
D501
Q506
R513

1 2

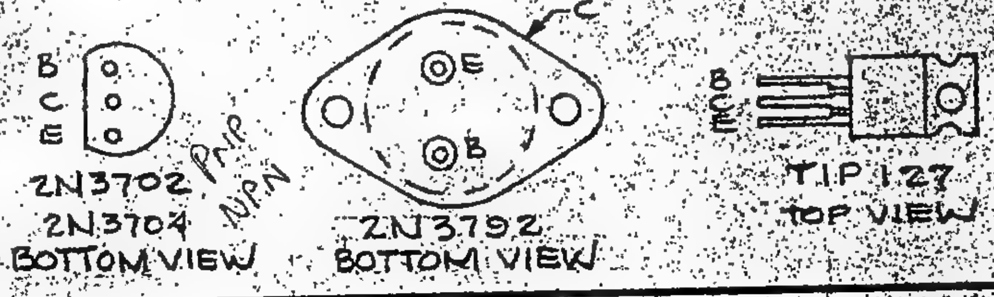
ALL RESISTORS 1/4 WATT
ALL CAPACITORS IN MICROFARRADS
UNLESS OTHERWISE NOTED

A

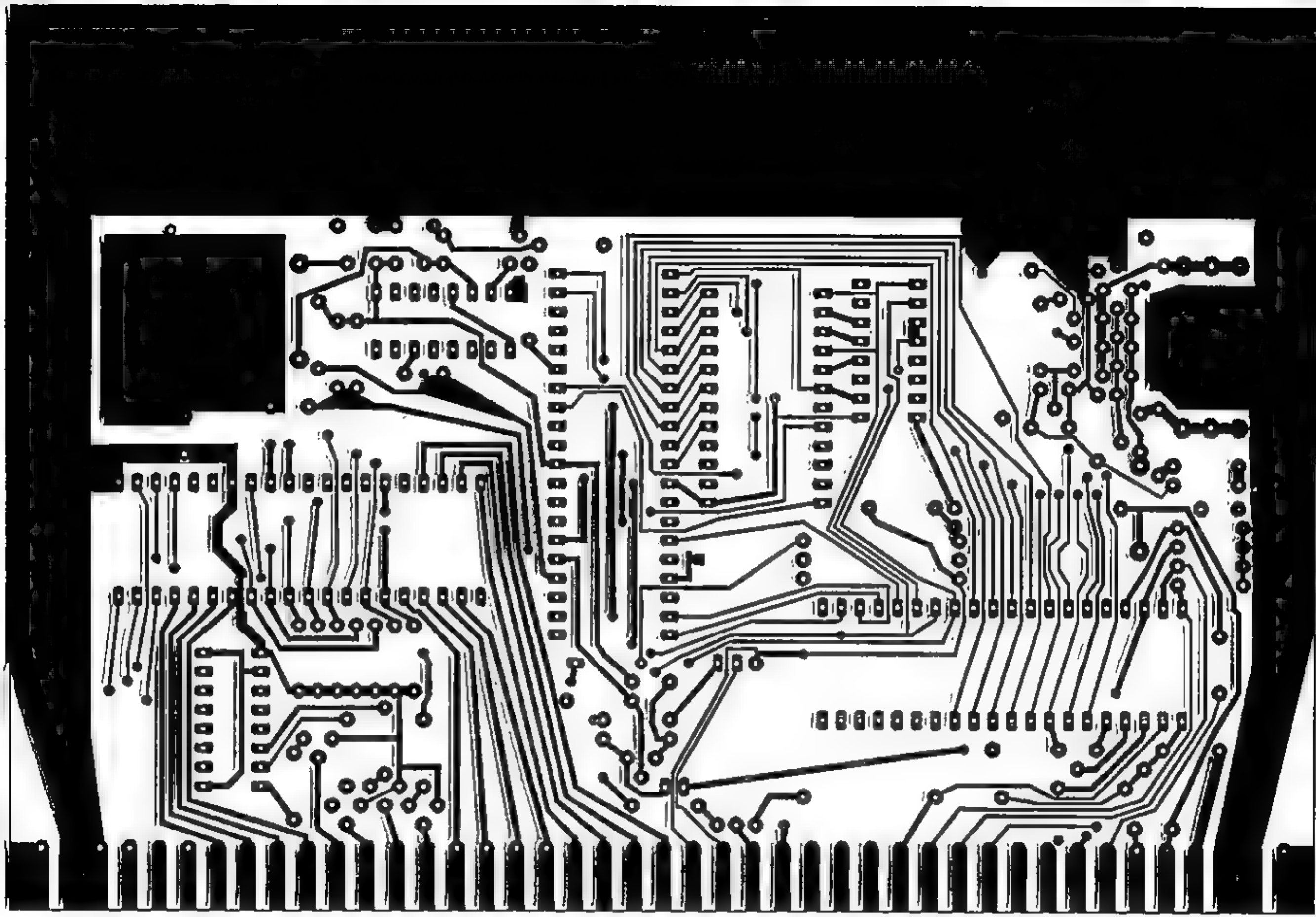


B

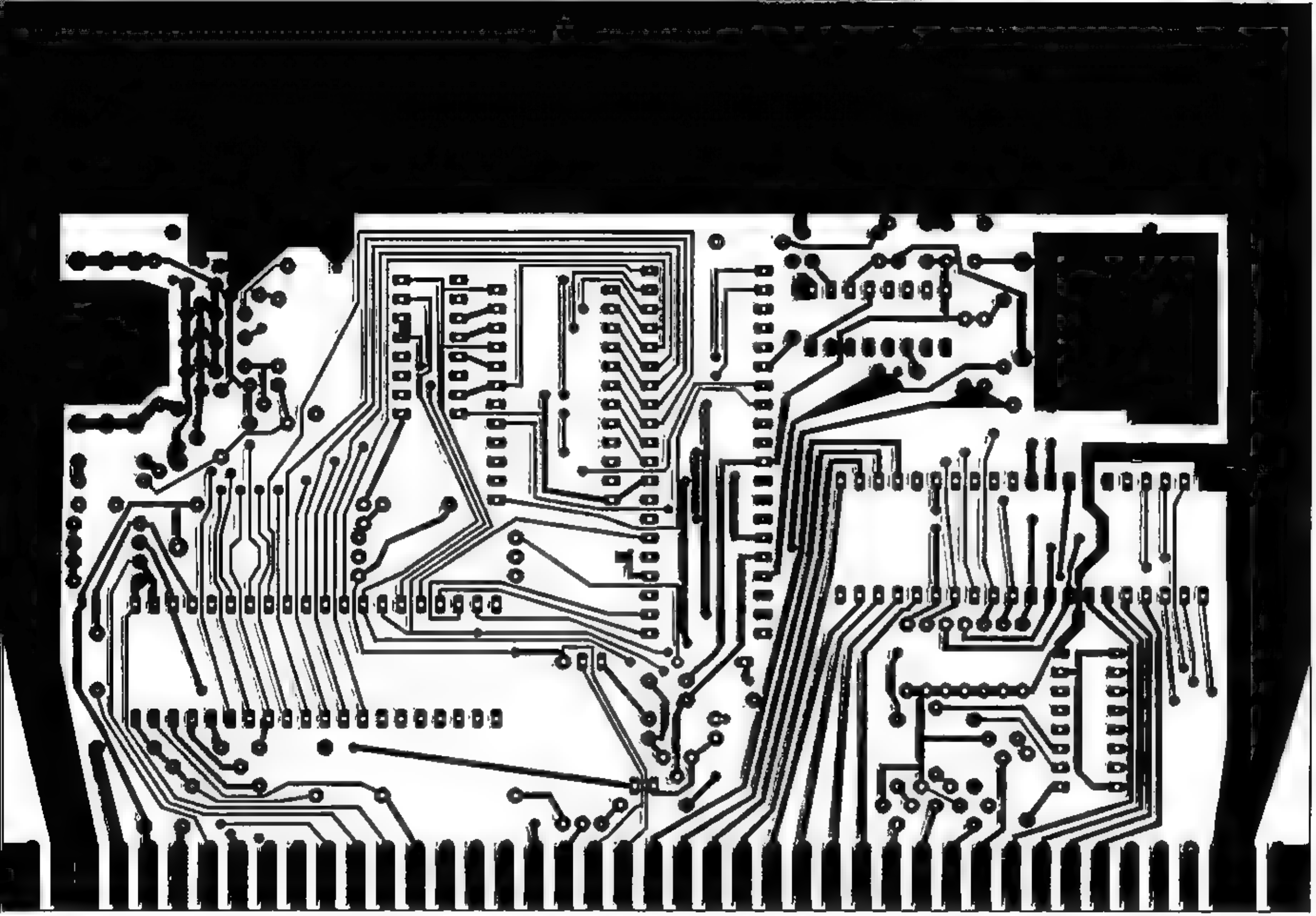
LAST SYM NO. USED	NOS. OMITTED
C 914	
D 903	
Q 908	
R 916	R913, R914



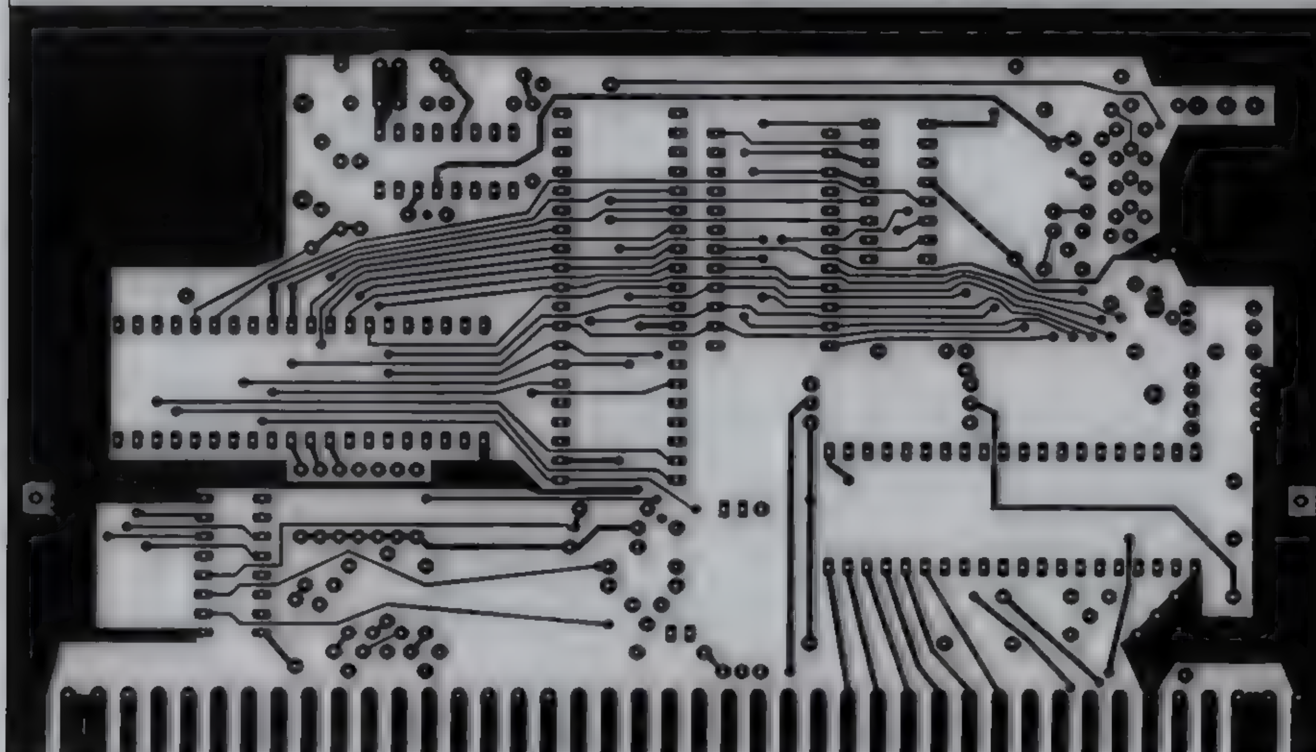
PRINTED ON NO. 1000H CLEARPRINT



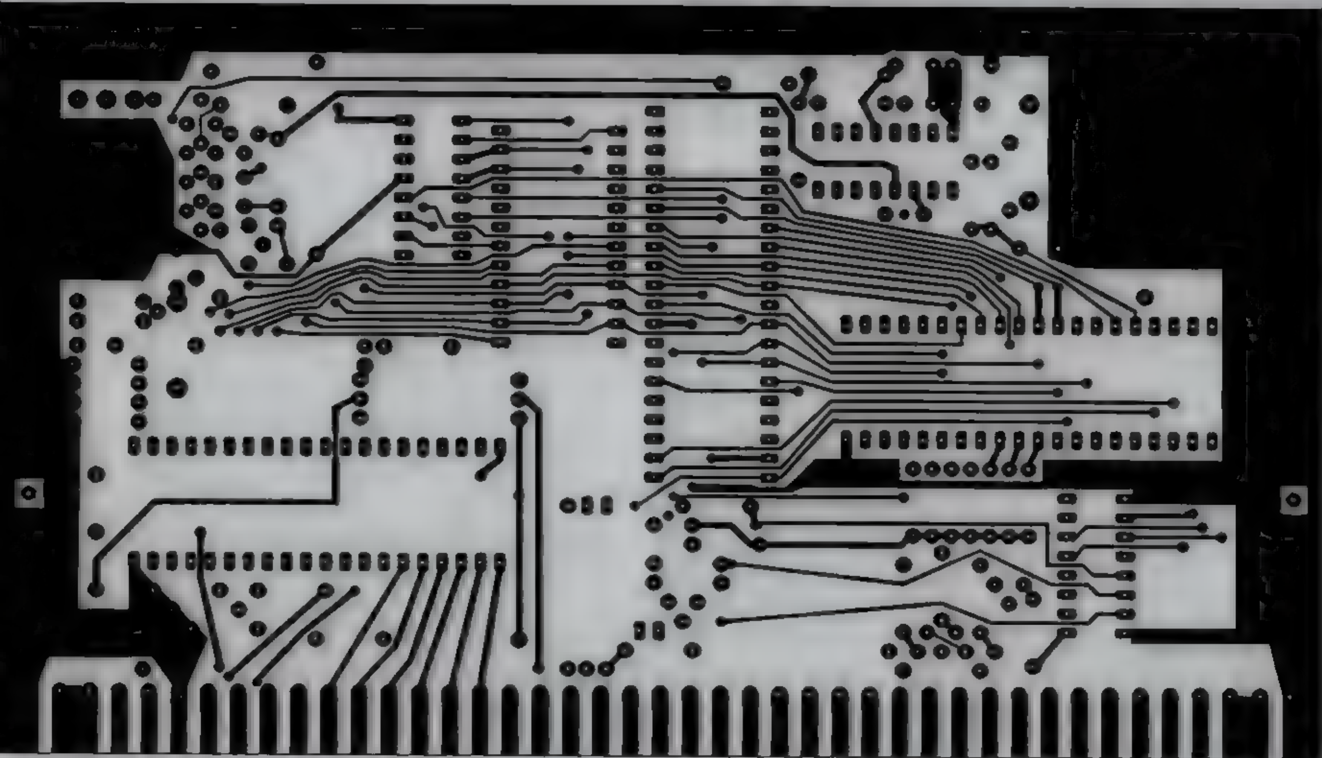
SOLDER
SIDE



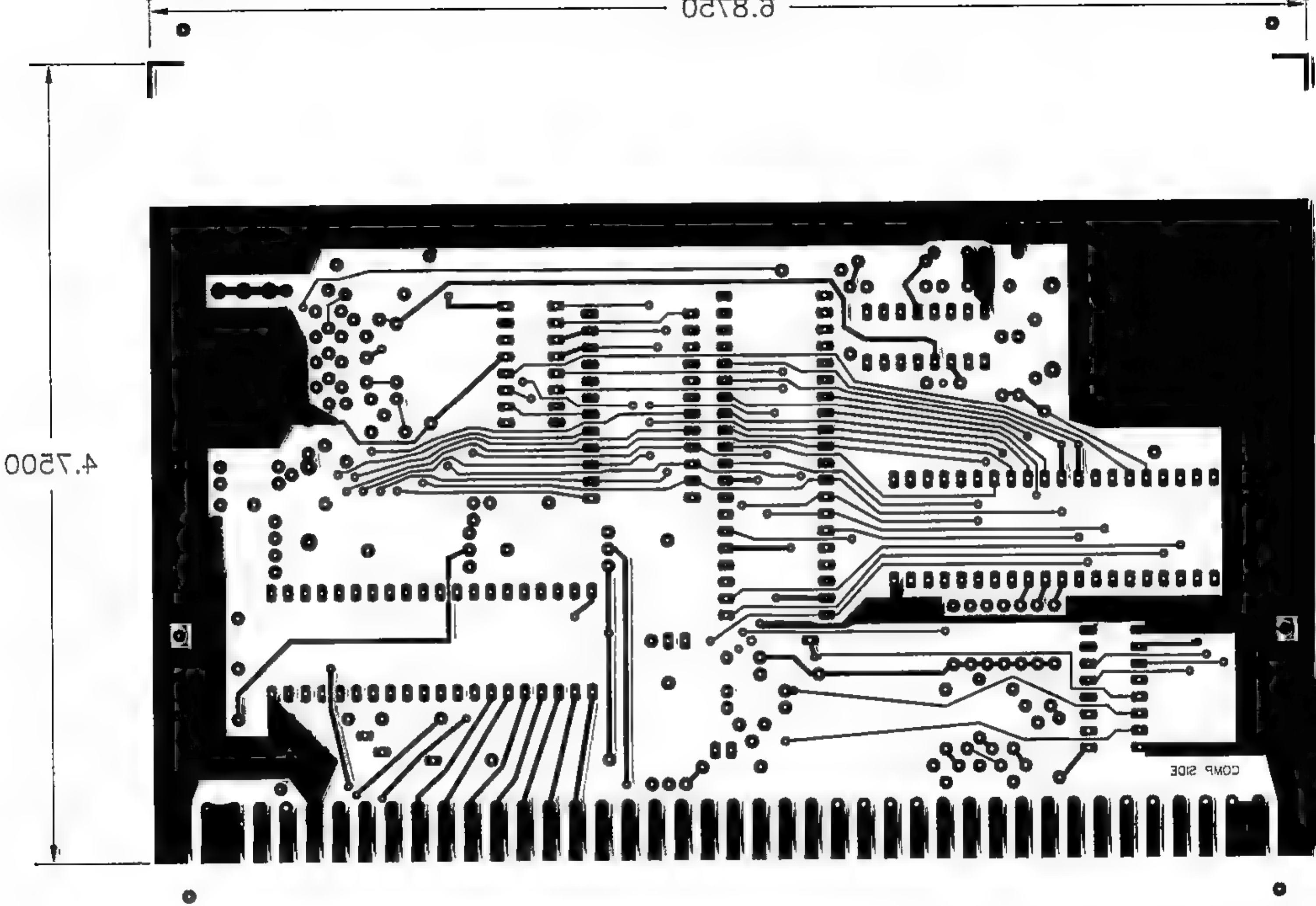
SOLDER
SIDE



OMPONENT
SIDE

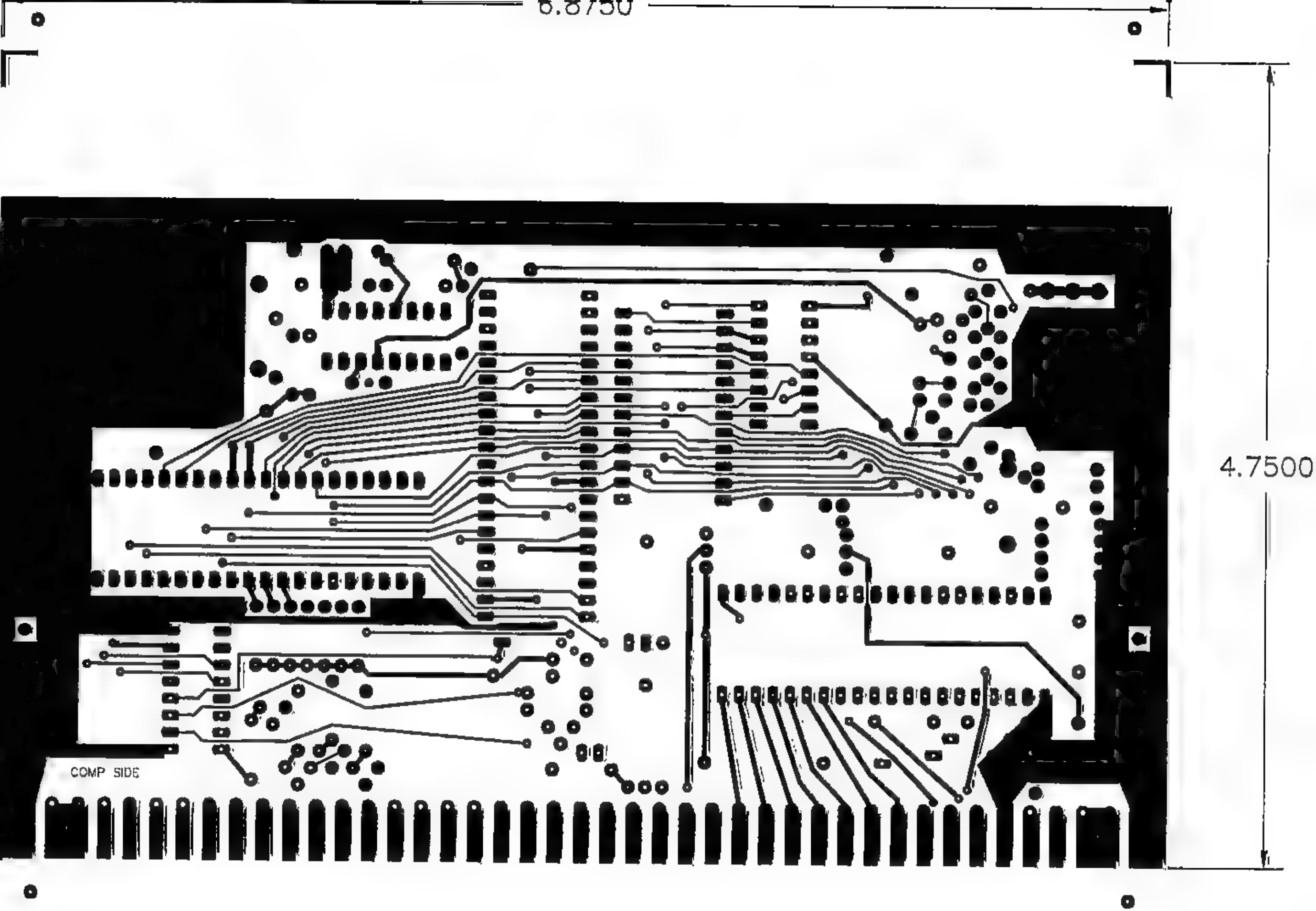


COMPONENT
SIDE



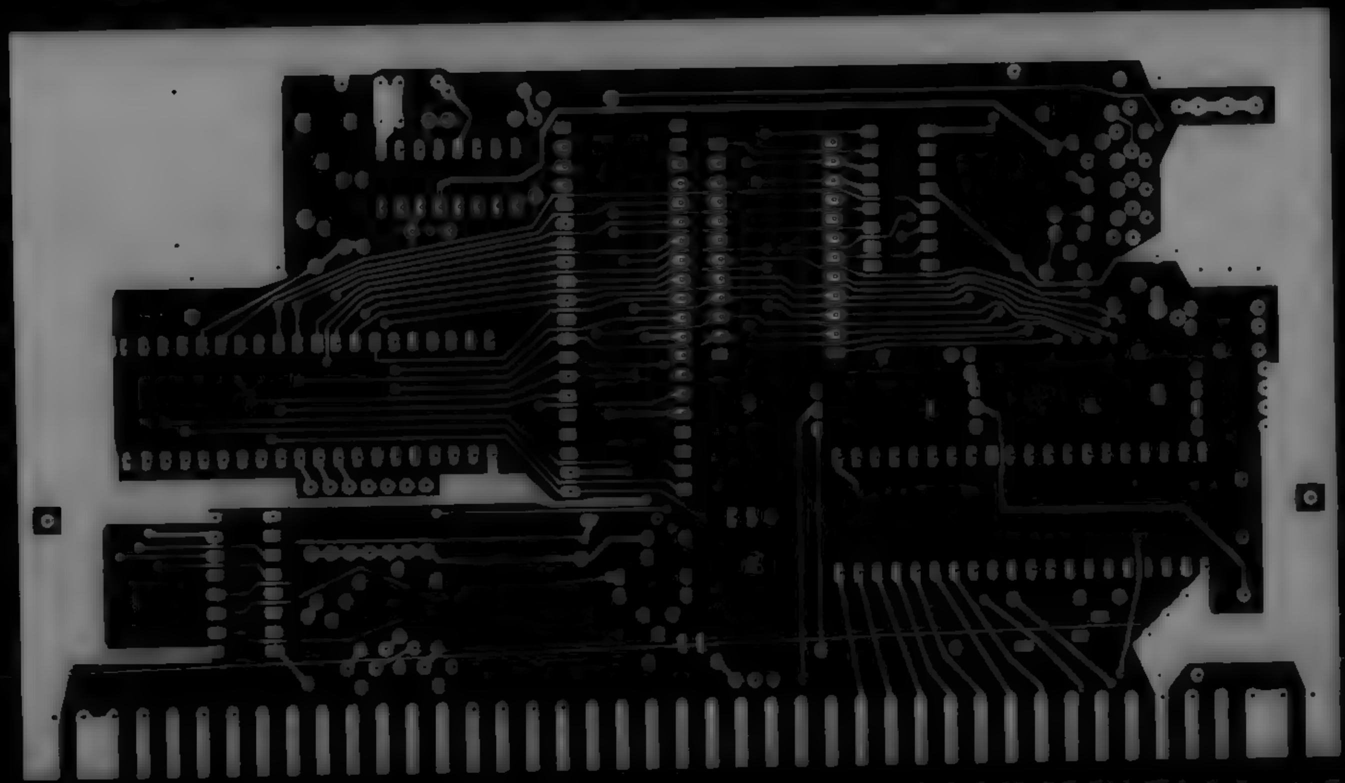
COMP SIDE VIEWED FROM TOP

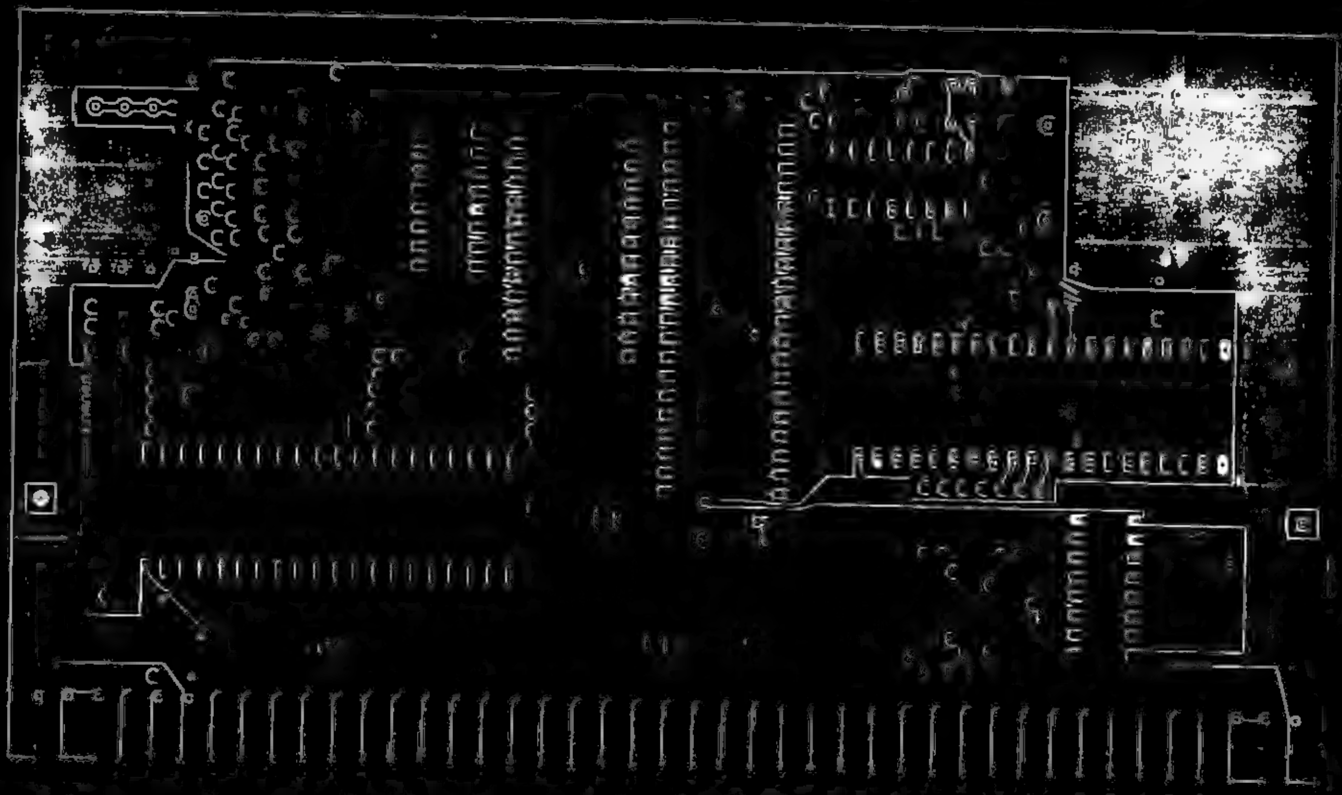
WRONG



COMP SIDE VIEWED FROM TOP

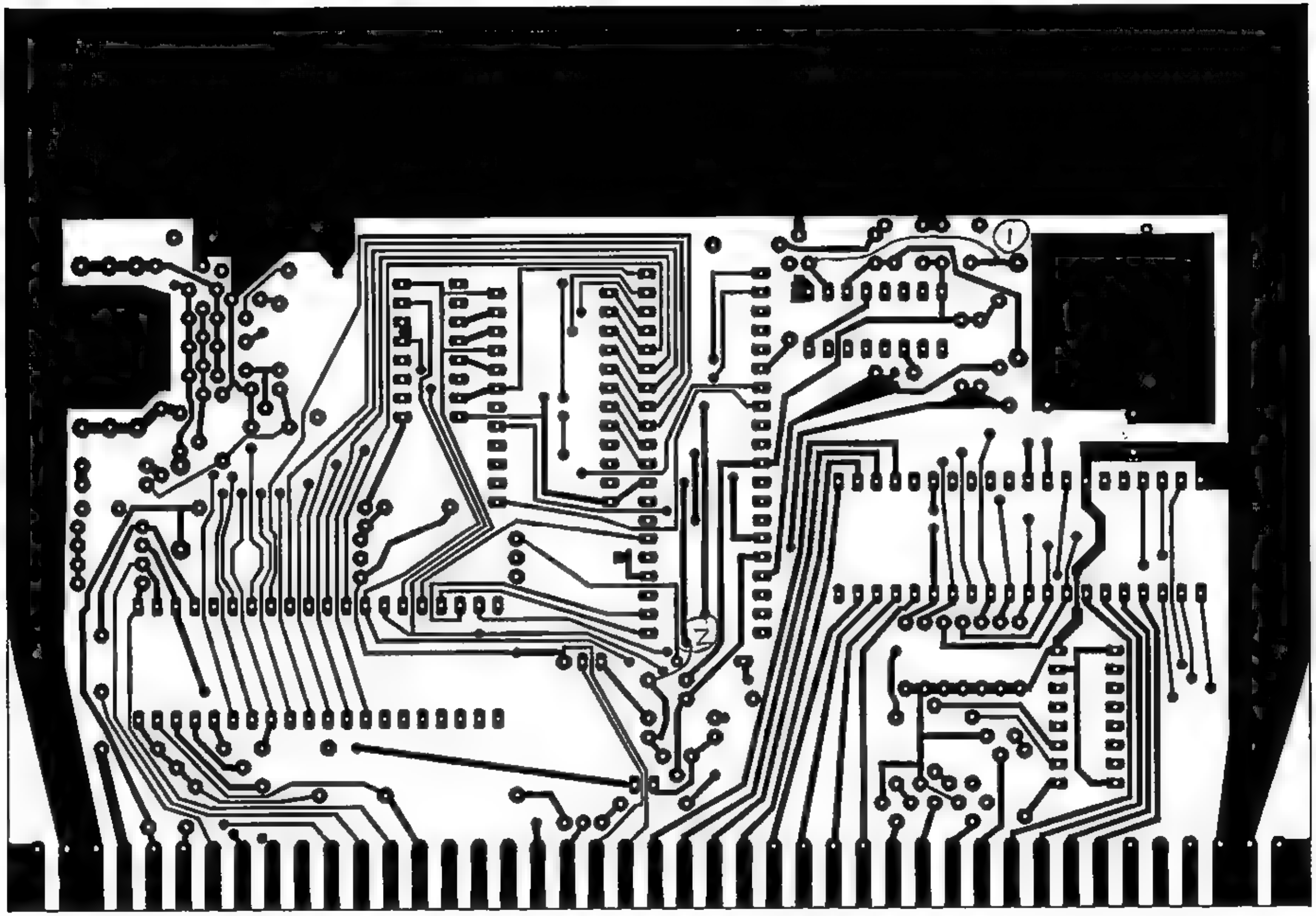
WRONG



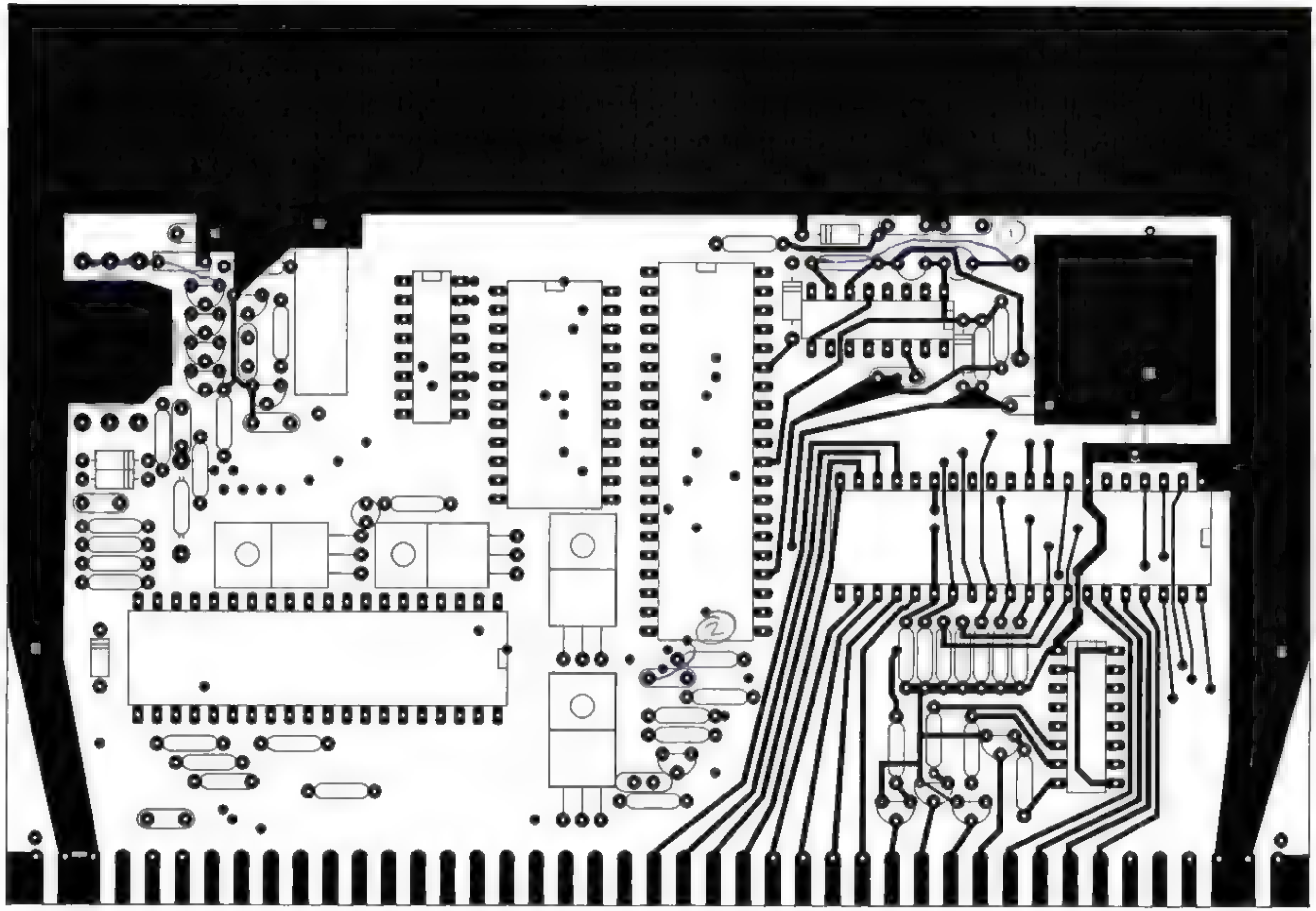


Corrections:

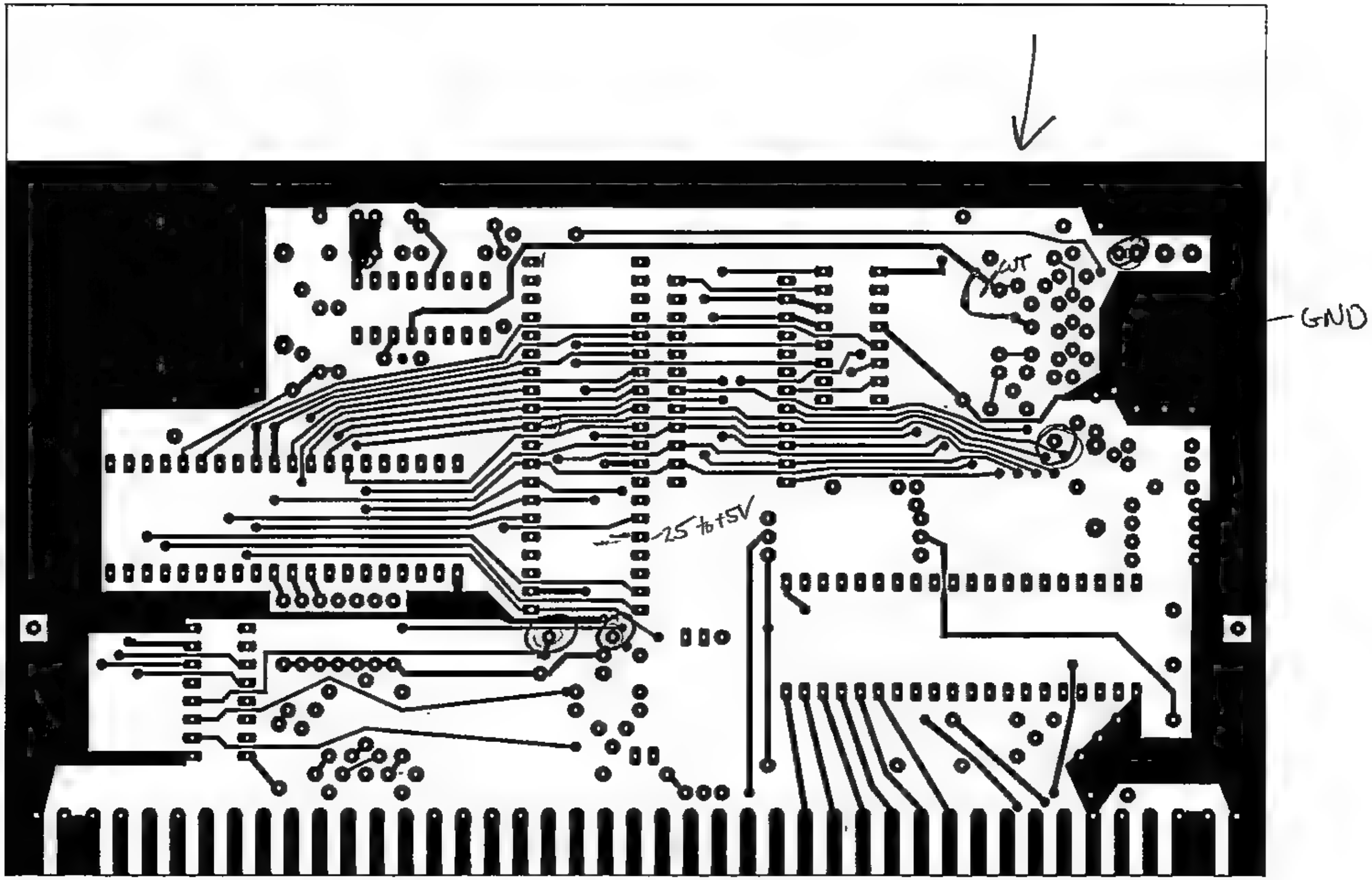
2



2 [illegible]
[illegible] side
Blue line = jumper
1 cut 1 jumper [illegible] side
see board

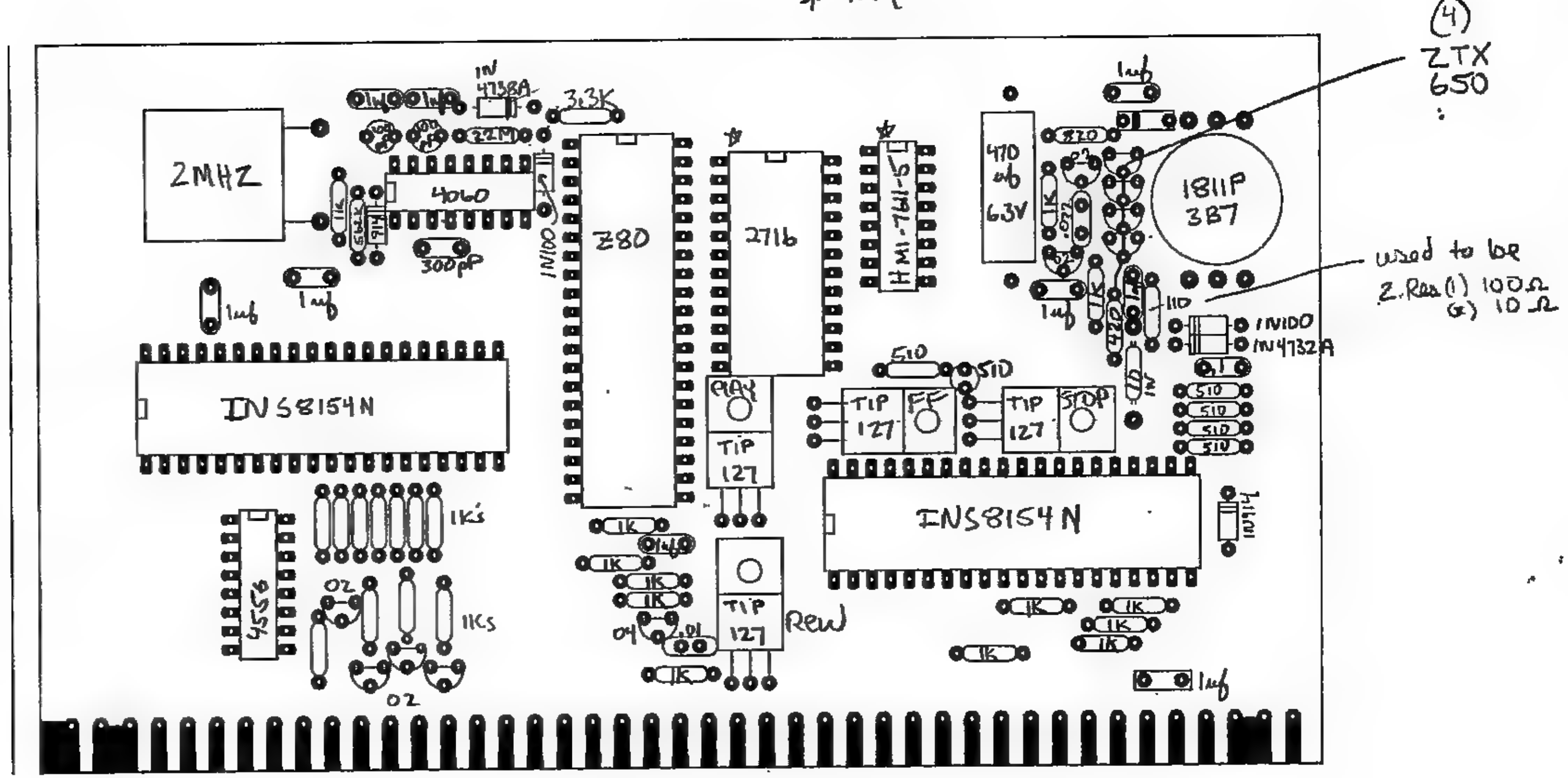


1 cut jumper



COMPONENT SIDE

* Programed



(4)
ZTX
650
used to be
Z. Res (1) 100Ω
(2) 10 Ω
2MHZ
4060
Z80
2716
HMI-7611-5
470 uf 63V
1811P
3B7
INS8154N
INS8154N
4556
PLAY
FF
STOP
TIP 127
Rew
1K's
1Ks
300pF
3.3K
2.2M
1N 4738A
1N100
1N4732A
510
1uf

1.4V

Log Com

1K

TIP 127

on = L(0V)

off = H(5V)

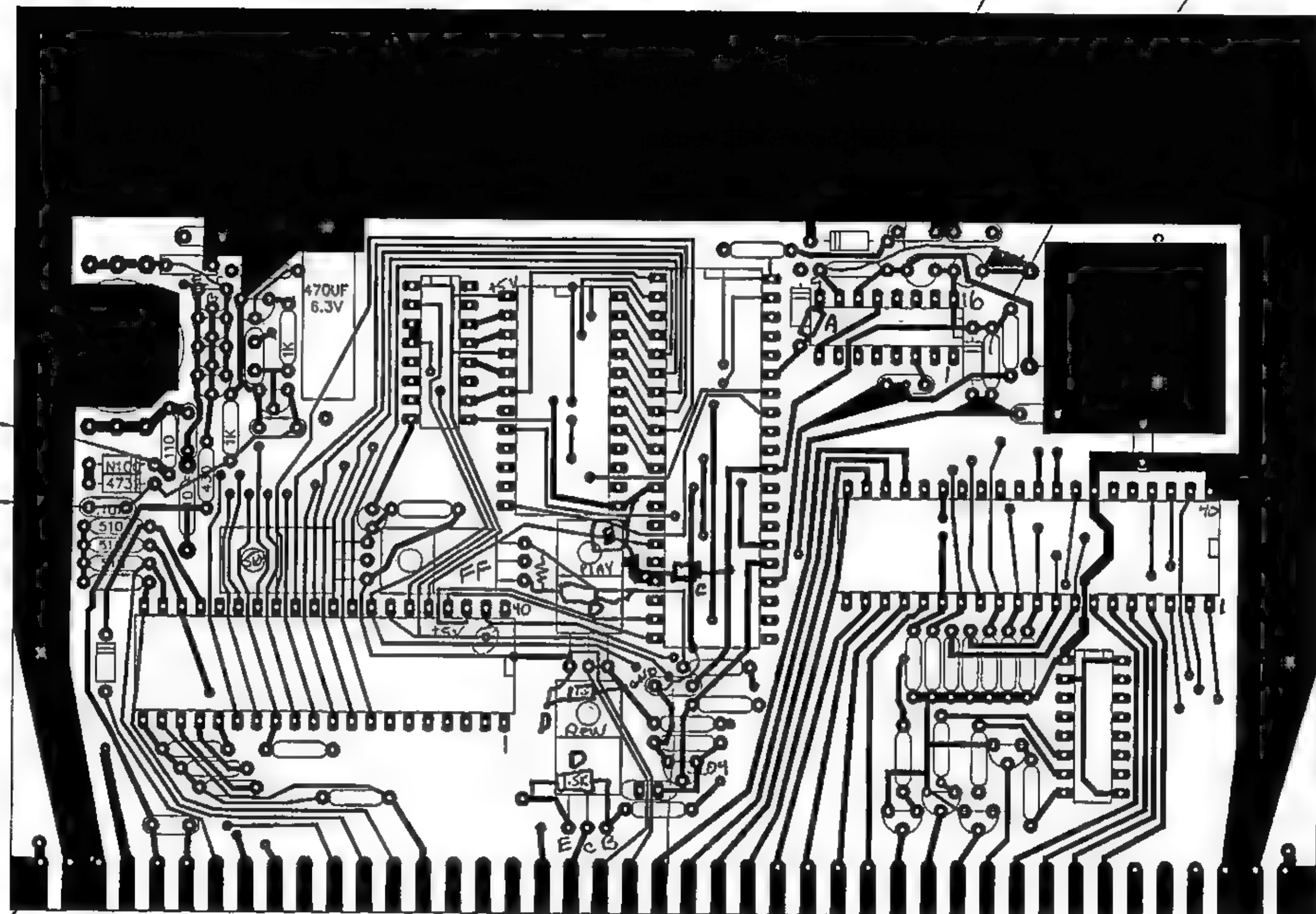
TO DECK CONTROL

$h_{FE} = 2500$

* Add trace

Reset RC

+5V



Comp on Back

A · 100pf

B · 1uf

C = 1,104 KΩ

D = 1500 1%

.1uf

on Back

GND

GND

* Add trace

Pin 24

5V

1.0M

1uf

Wait RC

1,100,000

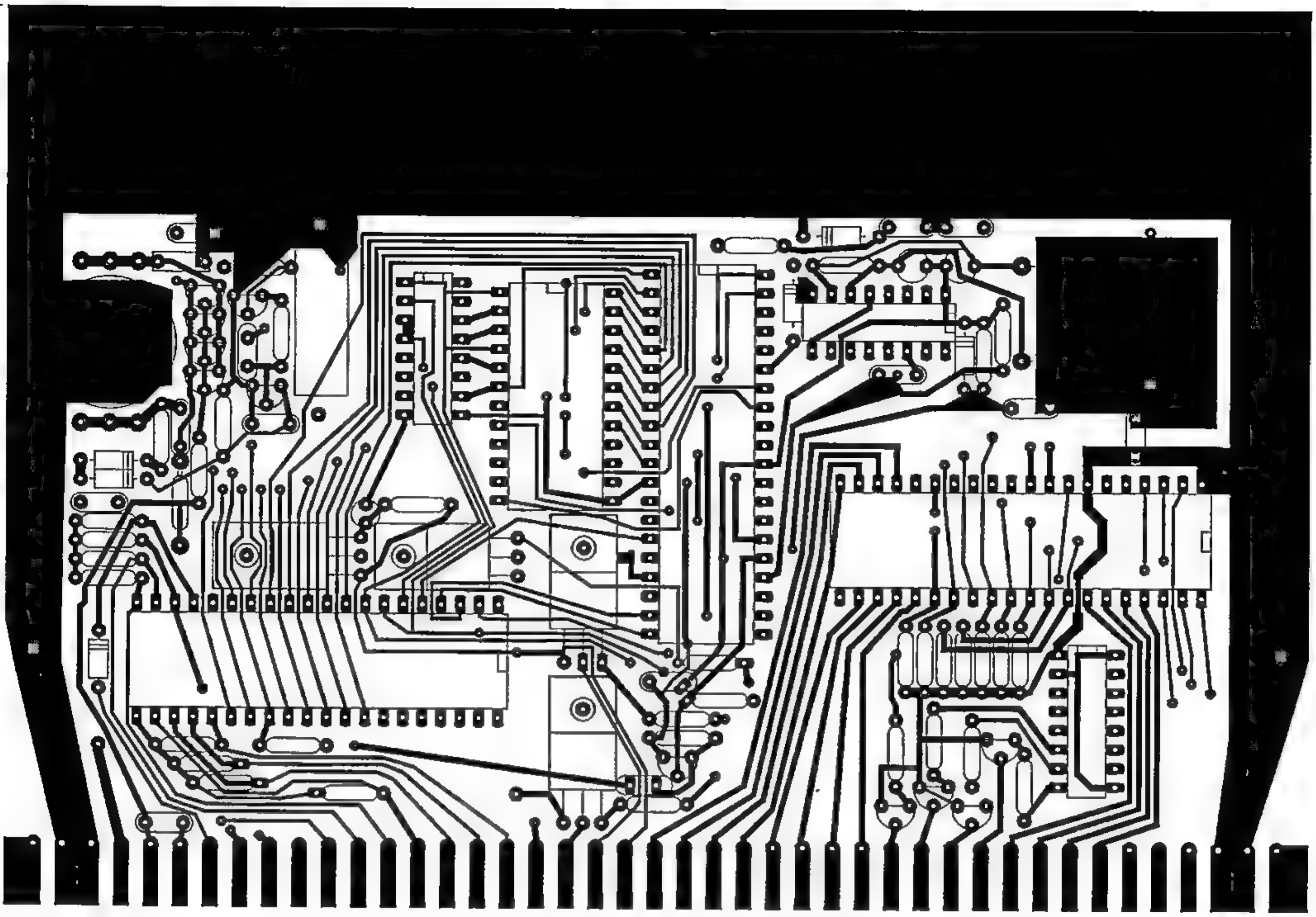
3702 = PNP

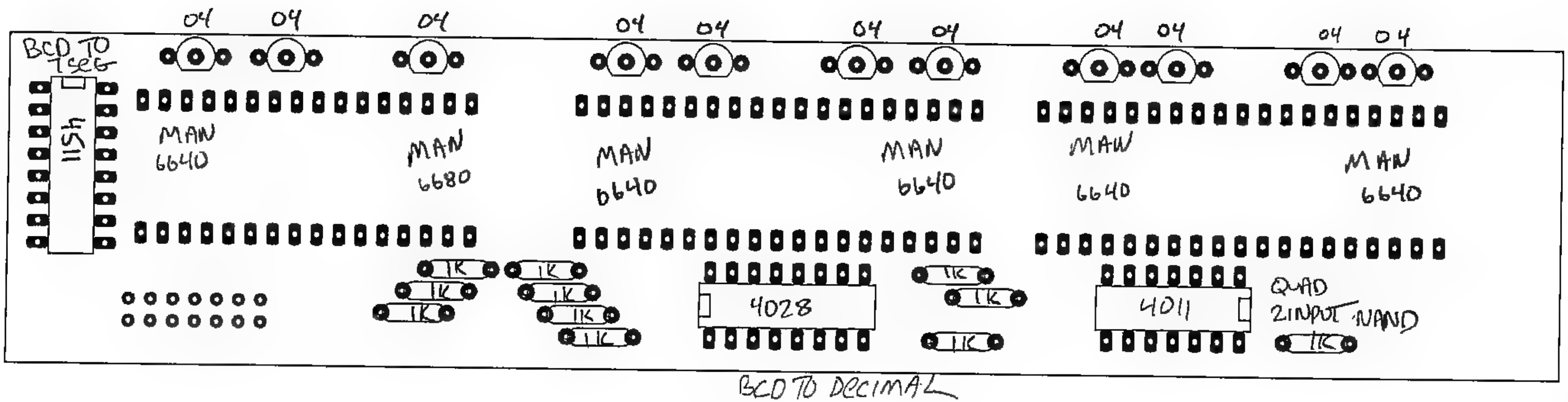
3704 = NPN

SOLDER SIDE

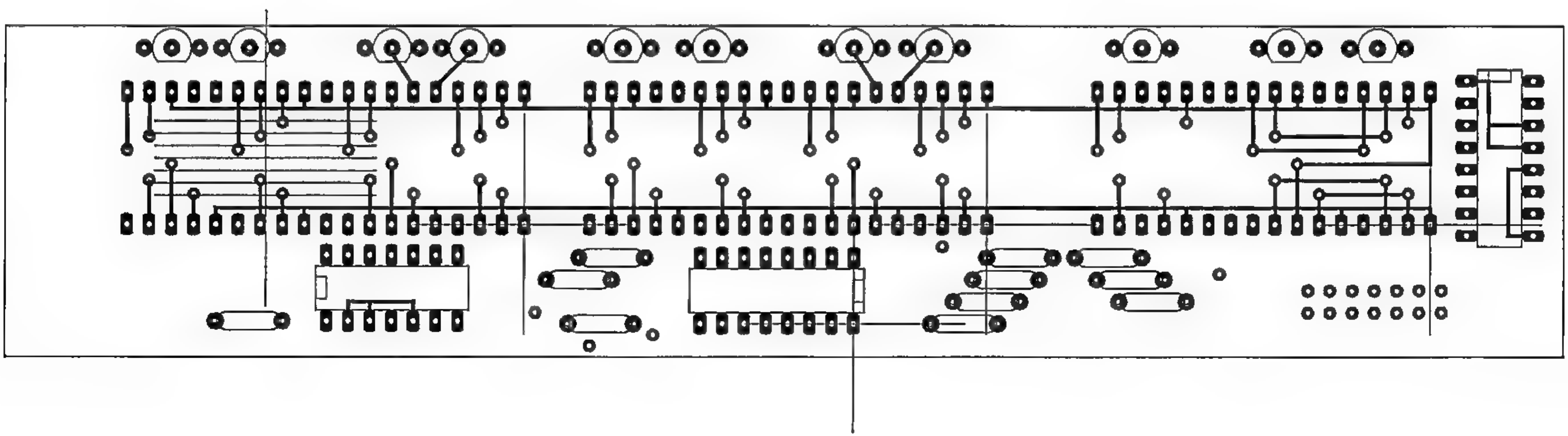
CT

3-26-90





BCD TO 7SEG
4511
04
04
04
04
04
04
04
04
04
04
04
MAN 6640
MAN 6680
MAN 6640
MAN 6640
MAN 6640
MAN 6640
1K
4028
4011
QUAD 2INPUT NAND
BCD TO DECIMAL



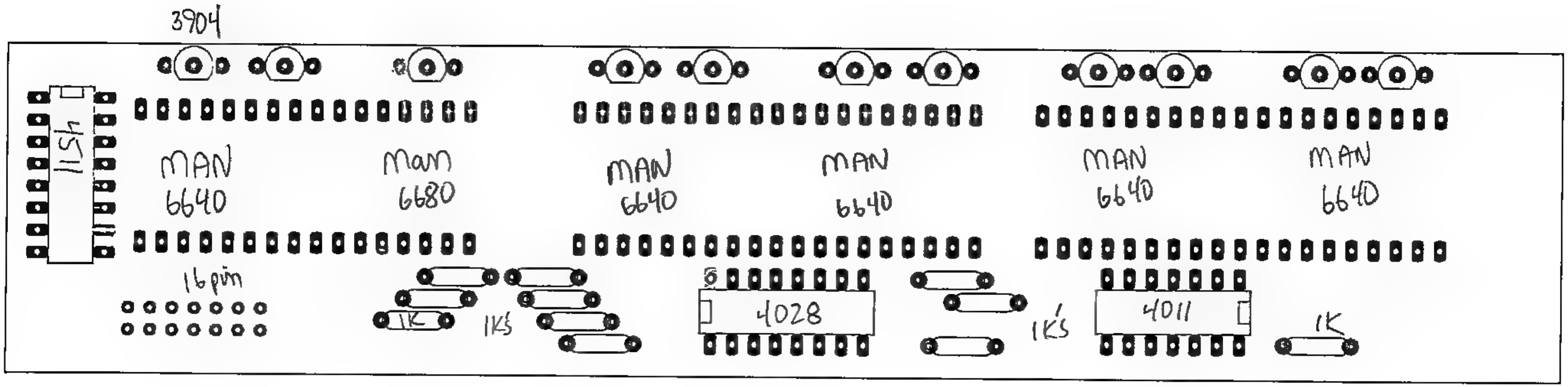
4511 - BCD-to-7seg latch/dec/driver

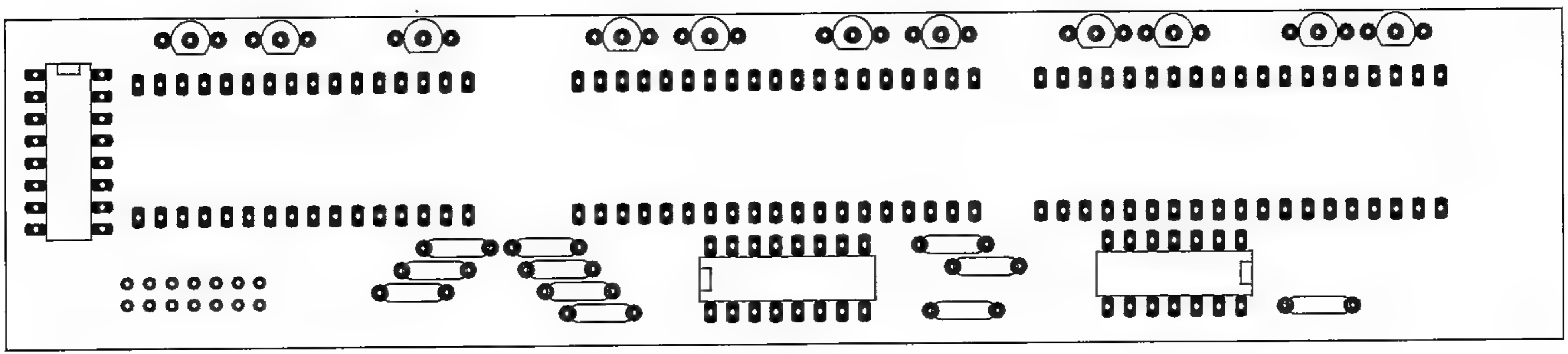
4028 - BCD to decimal decoder / bin to octal

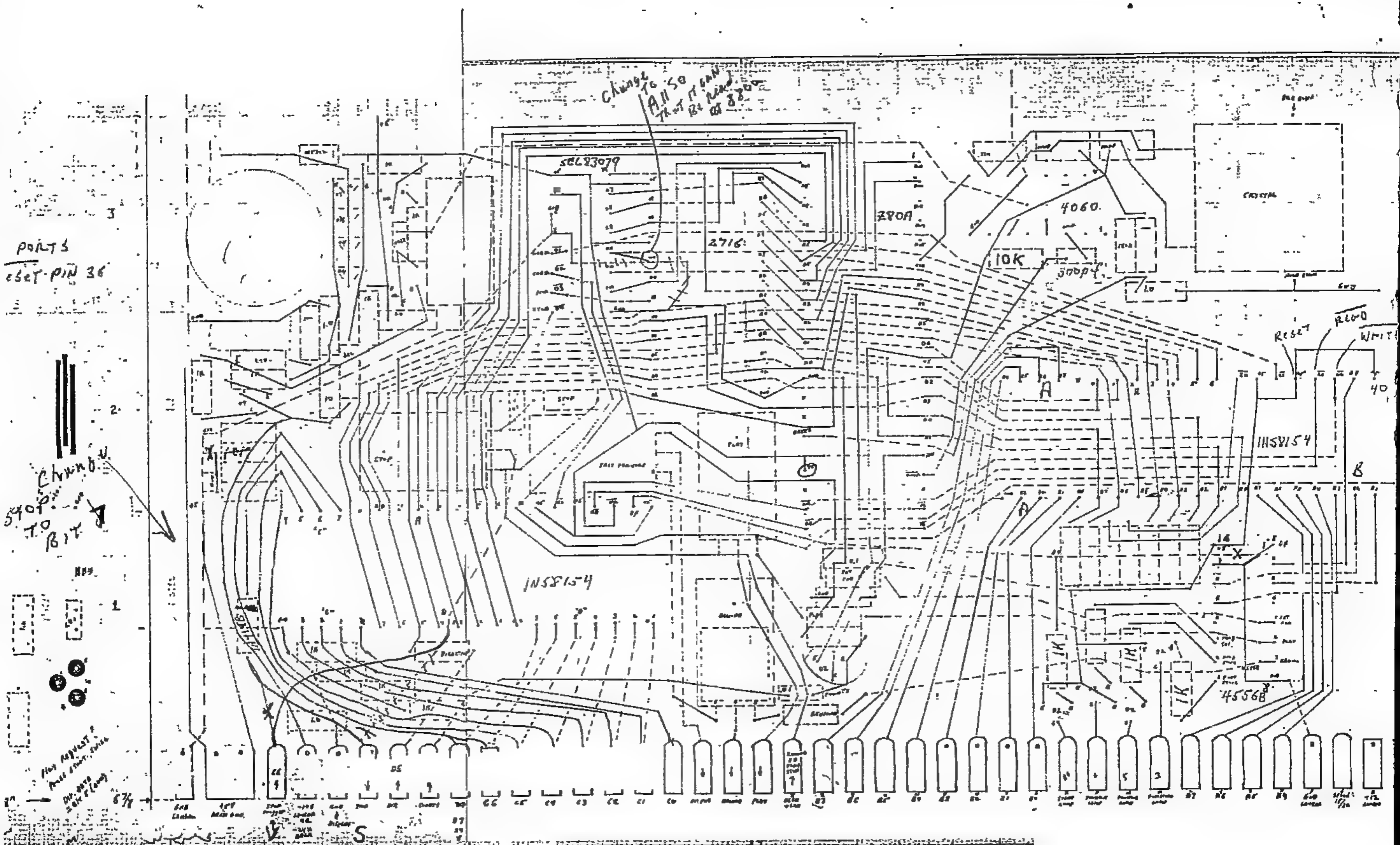
4011 - QUAD 2 input NAND x 4

ST_DISP

FRONT



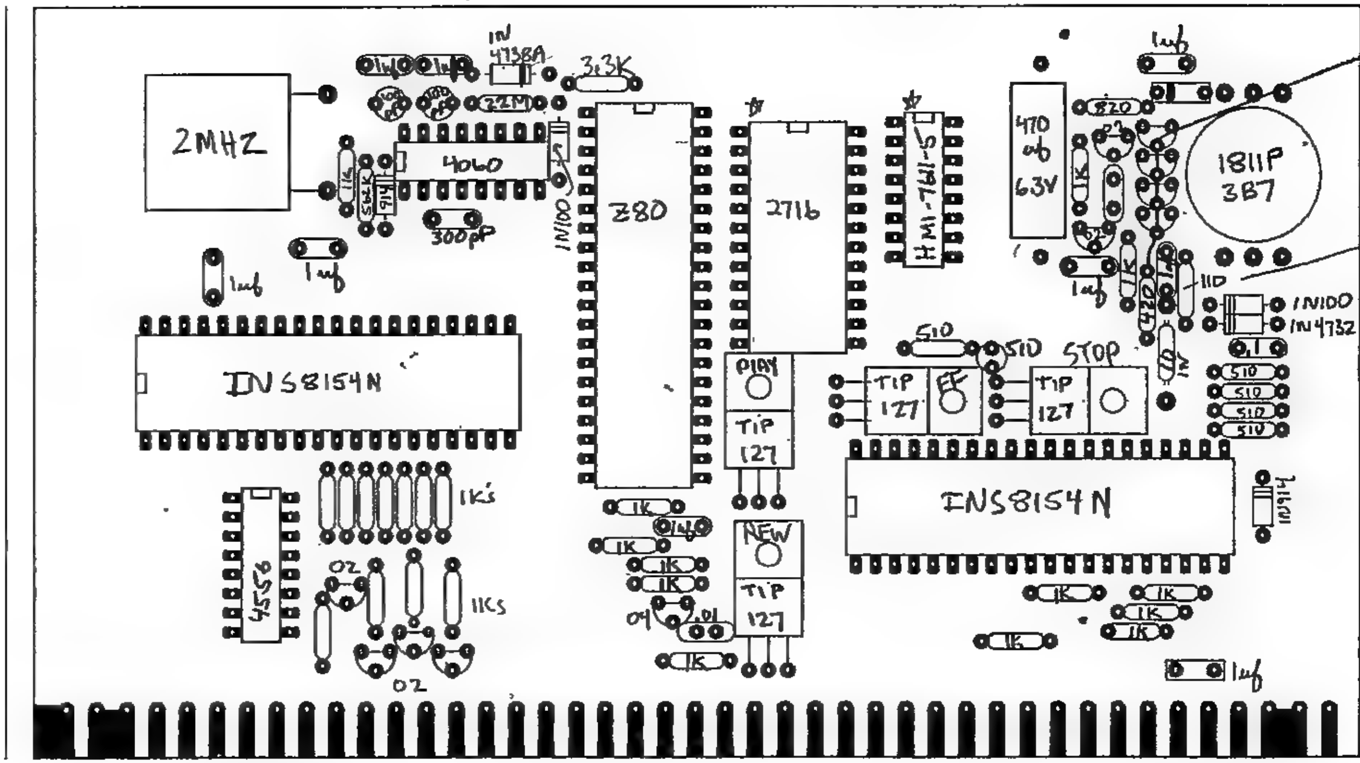




Change To A1150 That it can Be Read at 8800
SEL83079
2716
Z80A
4060
10K
500pf
CRYSTAL
PORTS
RESET PIN 36
RESET
READ
WRITE
40
A
B
IN5B154
IN58154
4556B
1K
Change 5409 To Bit 7
3
2
1
S

* Programed

(4)
ZTX
650
ECG 123



used to be
2 Res (1) 100Ω
(2) 10Ω

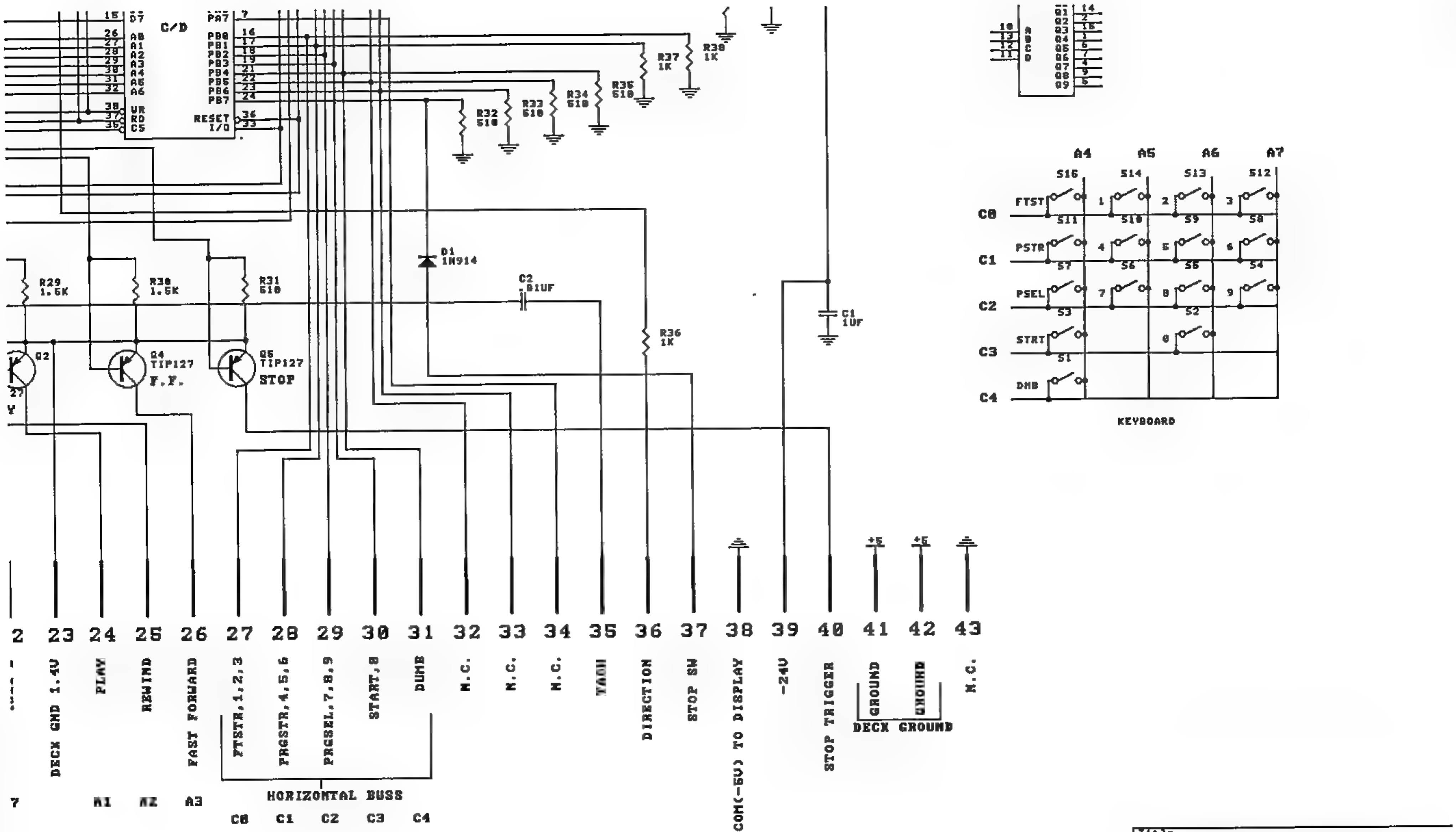
.010.000pf

ECG 85
2N3704 (6)
1.1M (5)
1.5K (20)
2MHz (3)

ECG 290A
2N3702 (12)
TIP 127 (5)
510 (25)
10Ω 1W (5)
IN 4732A (4)
IN 4738A (4)

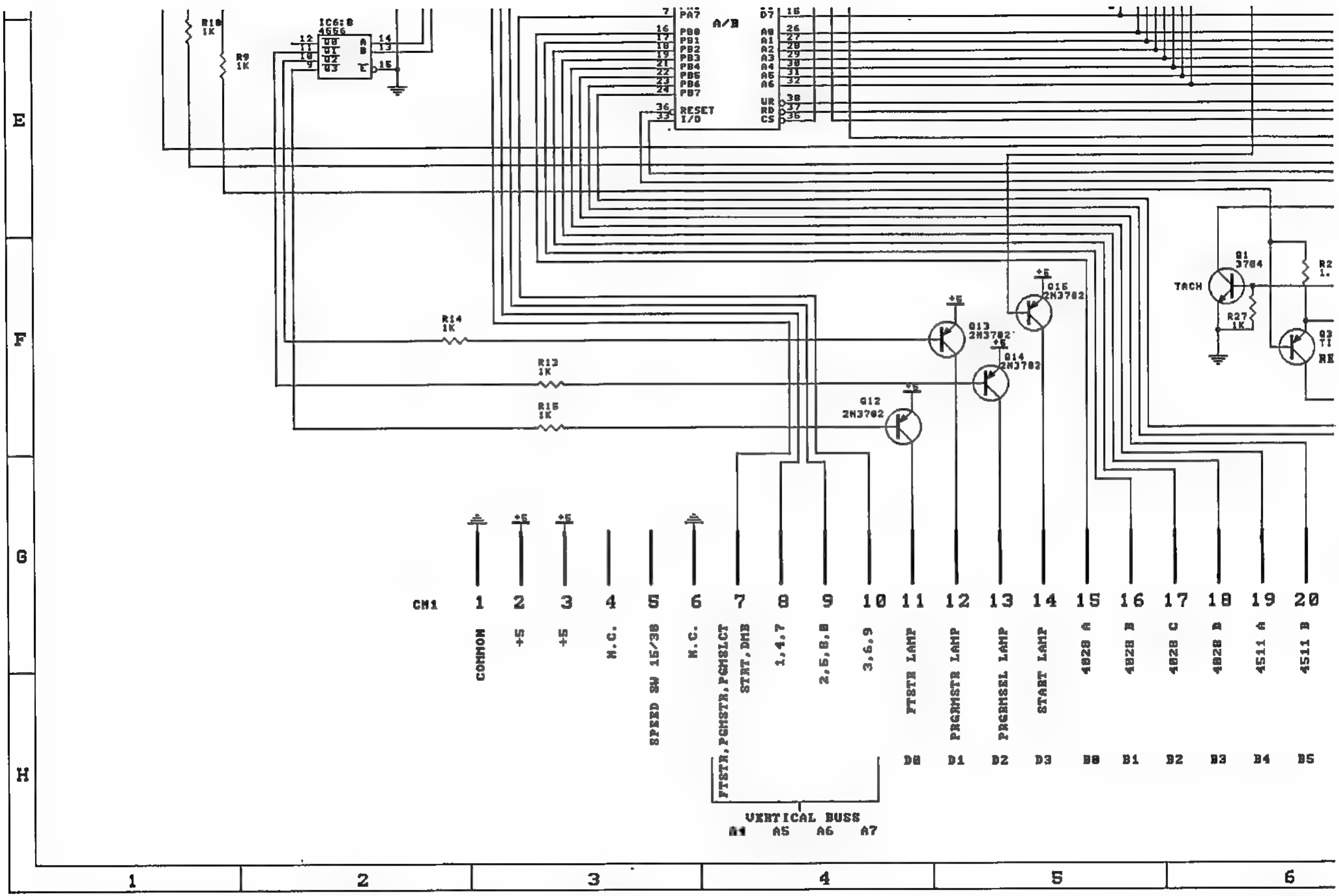
3.3K (25)
470uf 6.3V (3)
420 (10)
820 (10)
4 glass expoxy diode
562K (10)
22 IN100 (10)

IN914 - (10)
1uf - (10)
.01 (10)

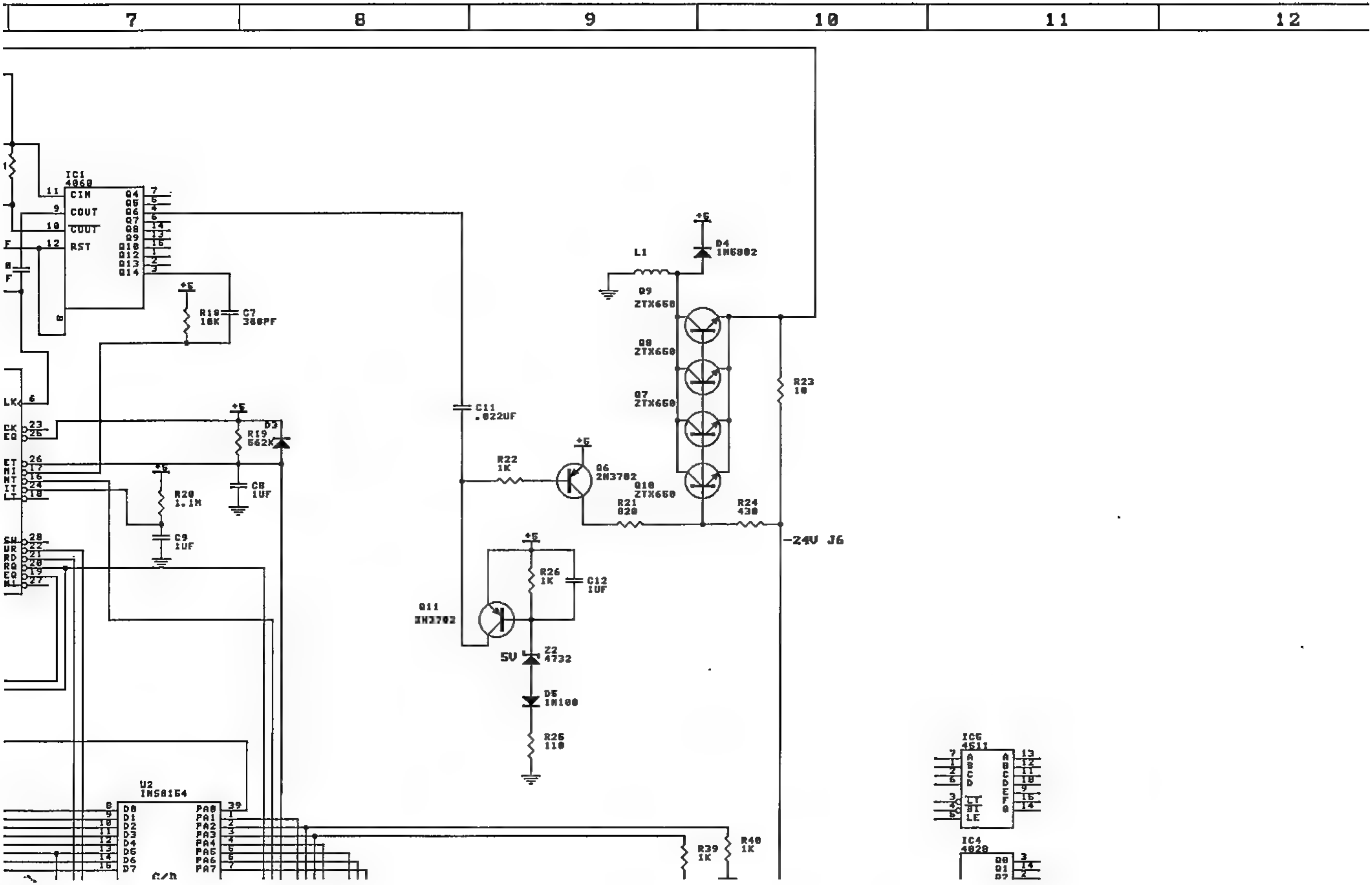


Title STEPHENS QII LOCATOR		
Size D	Number	Revision A
Date: 11-OCT 1992	Sheet 1 of 1	
File: ST_COMP/1	Drawn By: CORNEL	

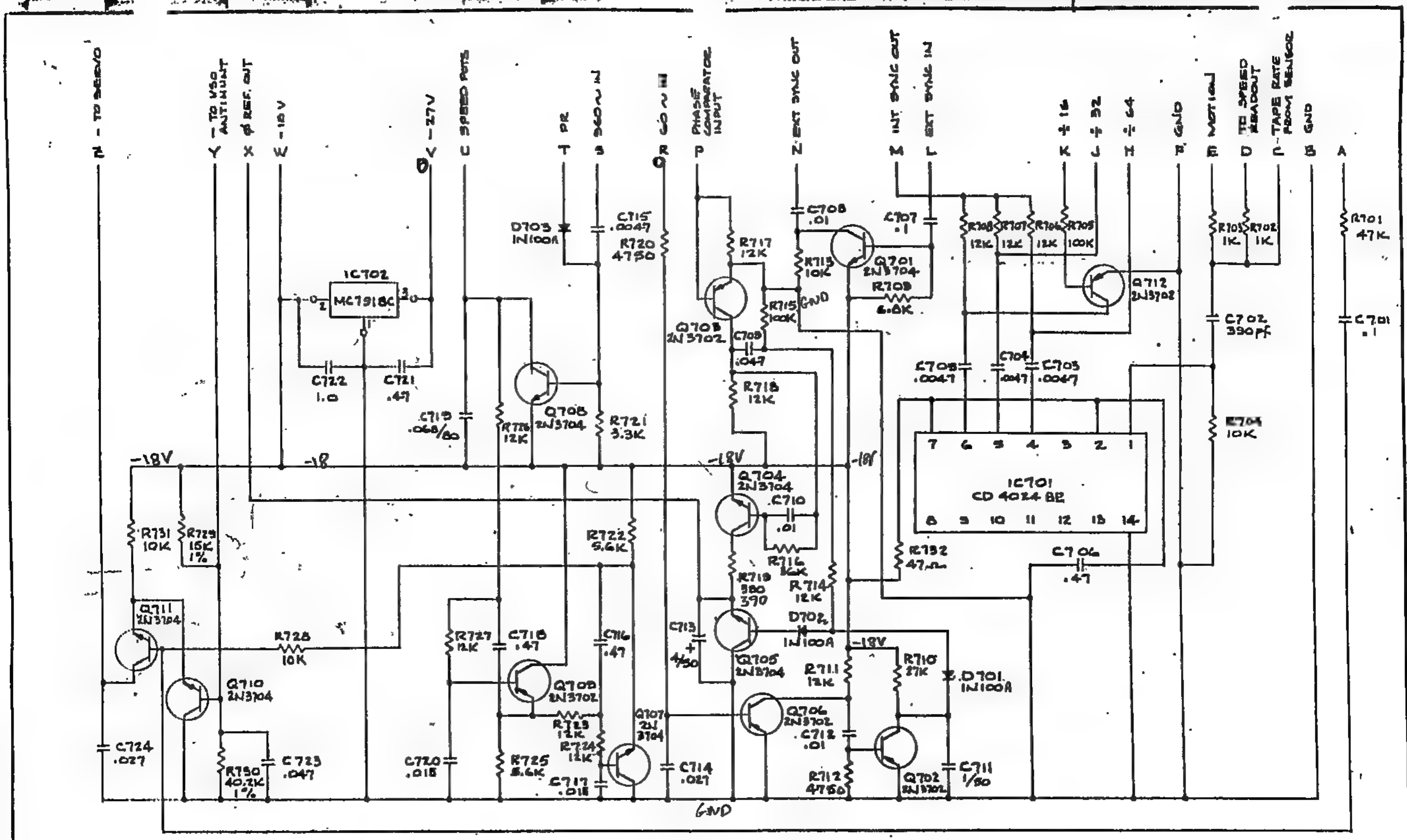
7	8	9	10	11	12



IC6:B 4556
A/B
RESET
I/O
R10 1K
R9 1K
R14 1K
R13 1K
R15 1K
Q12 2N3702
Q13 2N3702
Q14 2N3702
Q15 2N3702
Q1 3704
TACH
R27 1K
CN1
1 COMMON
2 +5
3 +5
4 N.C.
5 SPEED SW 15/38
6 N.C.
7 FTSTR,PGMSTR,PGMSLCT STRT,DMB
8 1,4,7
9 2,5,8,0
10 3,6,9
11 FTSTR LAMP
12 PRGMSTR LAMP
13 PRGMSEL LAMP
14 START LAMP
15 4028 A
16 4028 B
17 4028 C
18 4028 D
19 4511 A
20 4511 B
D0 D1 D2 D3 B0 B1 B2 B3 B4 B5
VERTICAL BUSS
A4 A5 A6 A7



7
8
9
10
11
12
IC1
4060
CIN
COUT
RST
R18
10K
C7
300PF
R19
562K
D3
C8
1UF
R20
1.1M
C9
1UF
C11
.022UF
R22
1K
Q6
2N3702
R21
820
R24
430
L1
D4
1N5802
Q9
ZTX650
Q8
ZTX650
Q7
ZTX650
Q10
ZTX650
R23
10
-24V J6
R26
1K
C12
1UF
Q11
2N3702
5V
Z2
4732
D5
1N100
R25
110
U2
IM58164
R39
1K
R40
1K
IC5
4511
IC4
4020



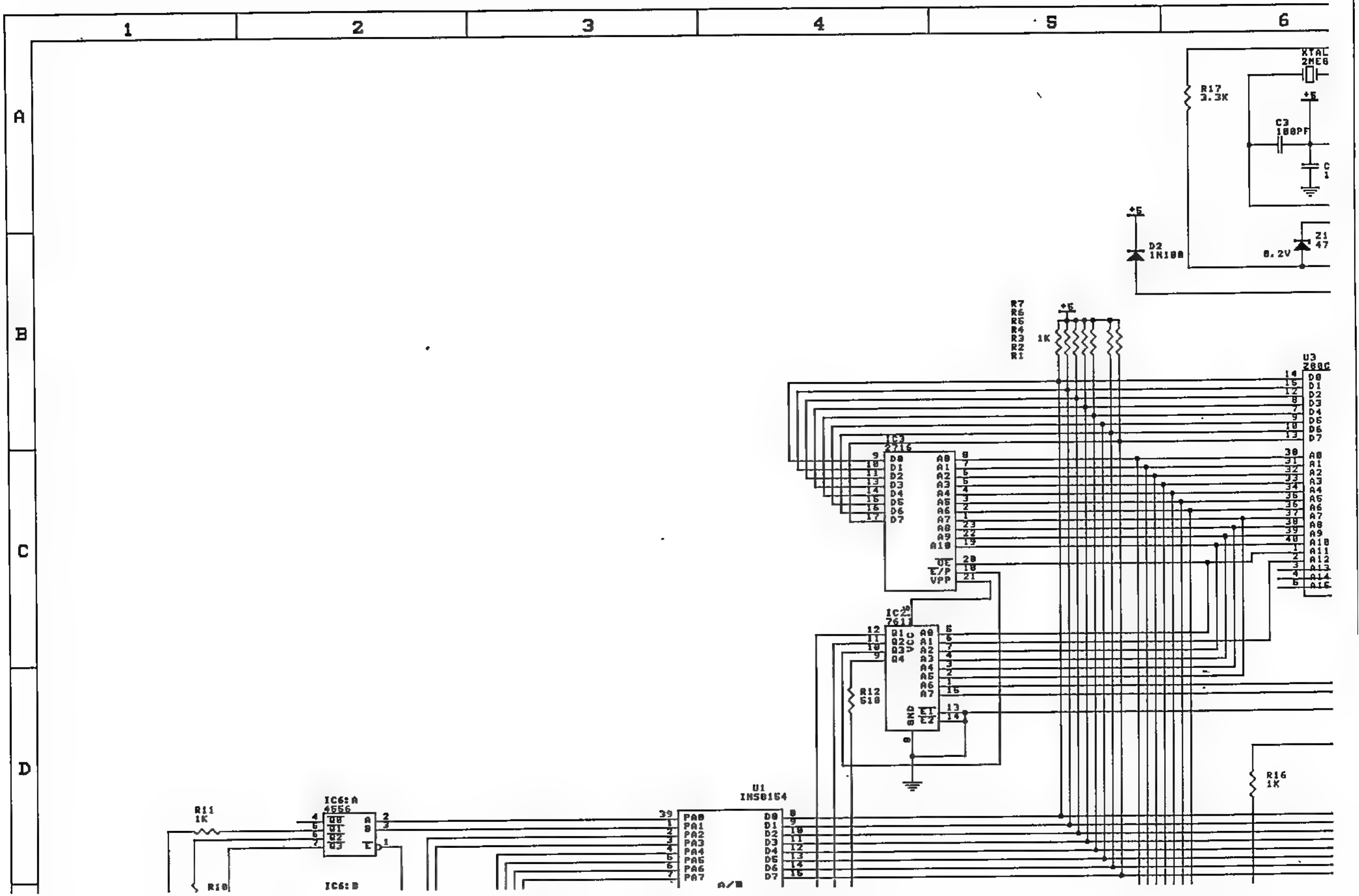
ALL CAPACITORS 50 VOLT AND IN MICROFARADS
ALL RESISTORS 1/4 WATT

STEPHENS ELECTRONICS, INC.

SCALE:	APPROVED BY:	DRAWN BY Geier
DATE: 17 APR 78		REVISED 8-28-80

SCHEMATIC
CONVERTER CARD - 310164 A

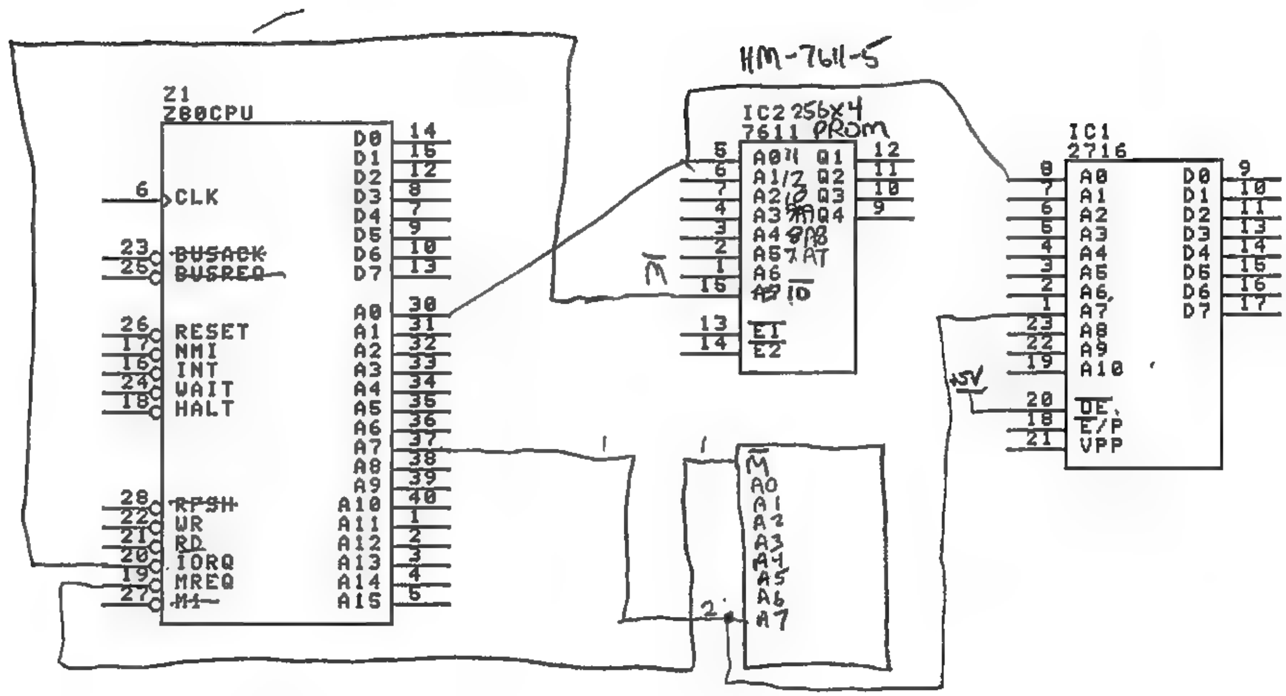
MODELS ... FIGURE 6-11 ... DRAWING NUMBER SE-0701A



1
2
3
4
5
6
A
B
C
D
XTAL
R17
3.3K
C3
100PF
+5
D2
1N100
8.2V
R7
R6
R5
R4
R3
R2
R1
1K
U3
Z80C
IC3
2716
IC2
7611
R12
510
R16
1K
U1
INS8154
R11
1K
IC6:A
4066
IC6:B
R10
A/B

$\overline{M}$ - memory Request

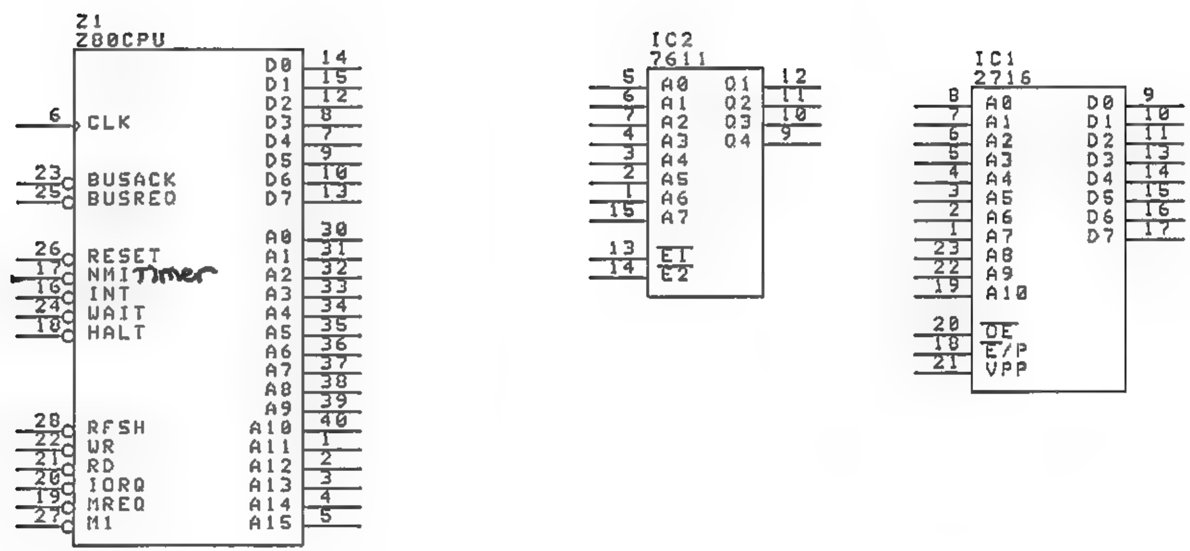
7611
1 - $\overline{M}$ REQ
2 - A7
3 - A8
4 - A9
5 - A11
6 - A12
7 - A10
8 - GND
9 - $\overline{O4}$? (STOP)
10 - $\overline{O3}$
11 - $\overline{O2}$
12 - $\overline{O1}$
13 - $\overline{C}$
14 - $\overline{C}$ (GND) } $\overline{EN}$
15 - $\overline{IO}$
16 - +5V



2^{16} - address

Hex - 8800

Title		
Size A4	Number	Revision
Date: 24-MAR 1990		Sheet of
File: ST_COMP/1		Drawn By:

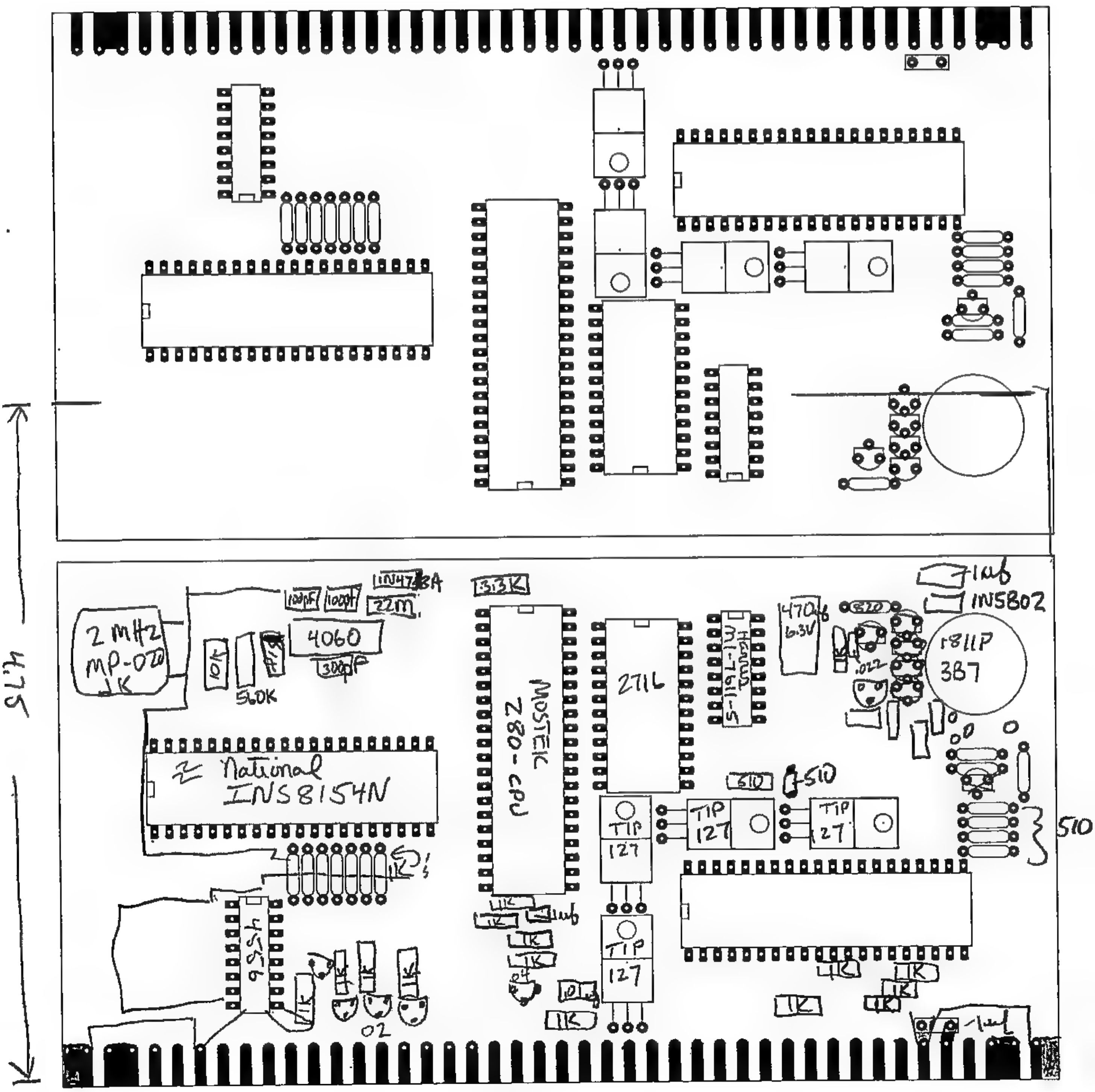


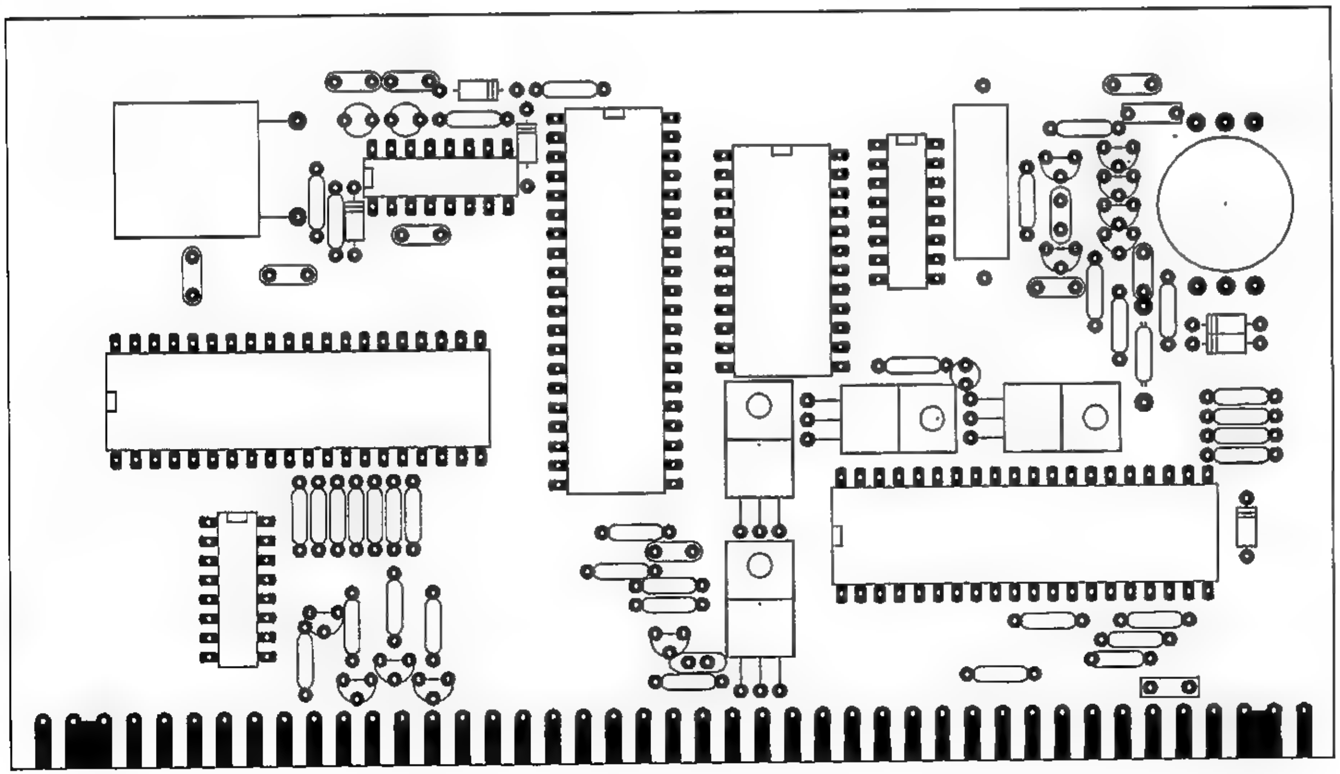
Title

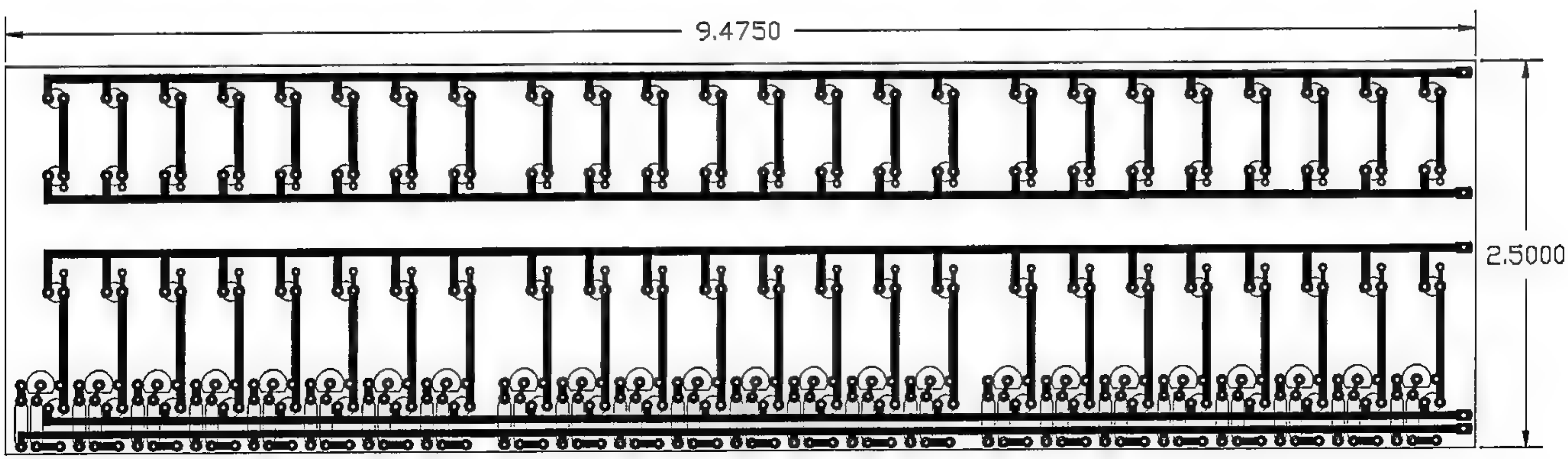
Size: A4 | Number | Rev

Date: 24-MAR 1990 | Sheet

File: ST_COMP/1 | Drawn By:

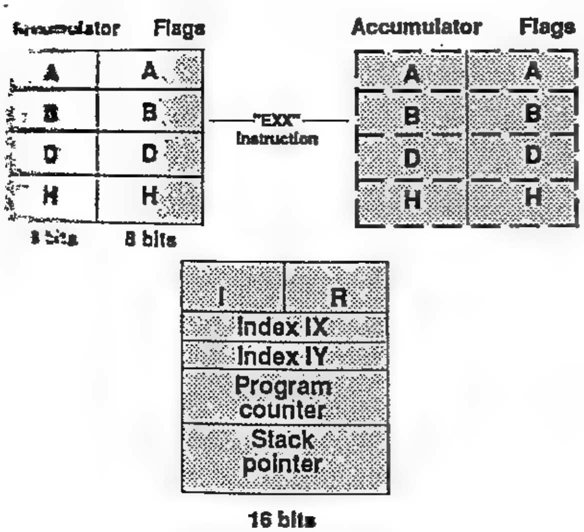

4.75
2 MHz
MP-020
100pF
1000pF
1N4733A
22M
4060
300pF
10K
560K
3.3K
National
INS8154N
MOSTEK
Z80-CPU
2716
470uf
6.3V
.022
1uf
1N5802
TIP 127
TIP 127
TIP 127
TIP 127
510
510
510
1K
02

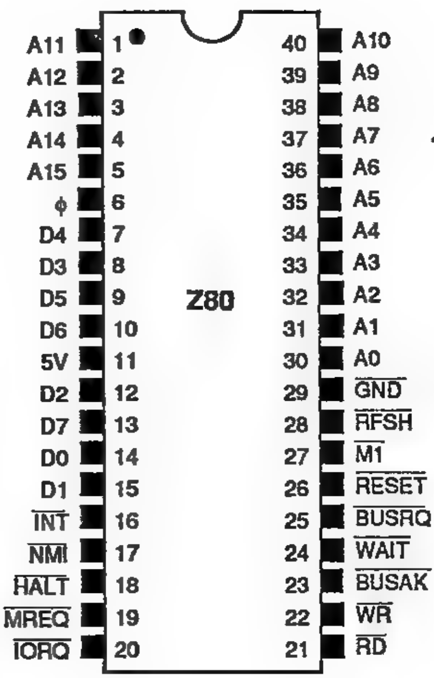



9.4750
2.5000

Zilog Z80

[illegible] Z80, a product of designers who left Intel to start their own company, [illegible] unique features with certain 8080 and 6800 features. Part of its great [illegible] from the fact of its compatibility with 8080 code, so that a program [illegible] 8080 will run on the Z80 without modification. The reverse, however, [illegible] curious but predictable result of this one-way-only compatibility has [illegible] most of the machines running the CP/M operating system are designed [illegible] Z80, most of the programs written under CP/M are written in 8080 code. [illegible] CP/M was itself written in 8080 code and the earlier CP/M computers [illegible] machines. TP/M, a CP/M-like operating system written in Z80 code for [illegible], has not been widely used. The Z80 has often been called a second- [illegible] 8080 because of this software compatibility and because some of the same [illegible] used in the Z80 are used in the 8080. Zilog has managed to produce [illegible] healthy longevity in an arena highlighted by very short product lives.





FLAGS

Carry Flag If the instruction generates a carry or a borrow, this flag is set.

Zero Flag If the result of the operation is a zero in the accumulator, this flag is set.

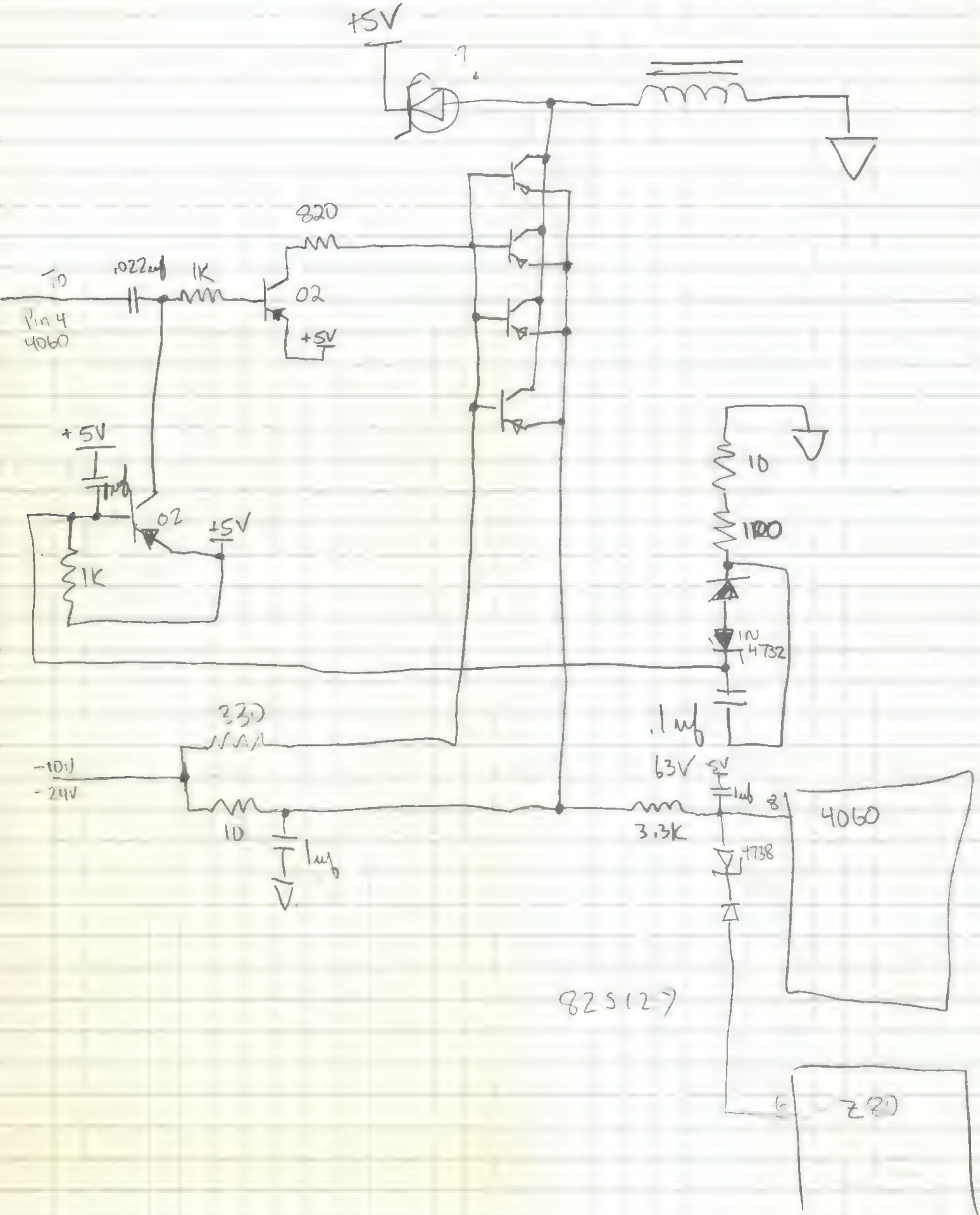
Sign Flag Represents a negative number. If the operation results in a 7-bit high in the accumulator, this flag is set because a 7-bit high is a negative number.

Parity/Overflow Flag This flag indicates the parity of the result in the accumulator when logical operations are performed. It also indicates overflow.

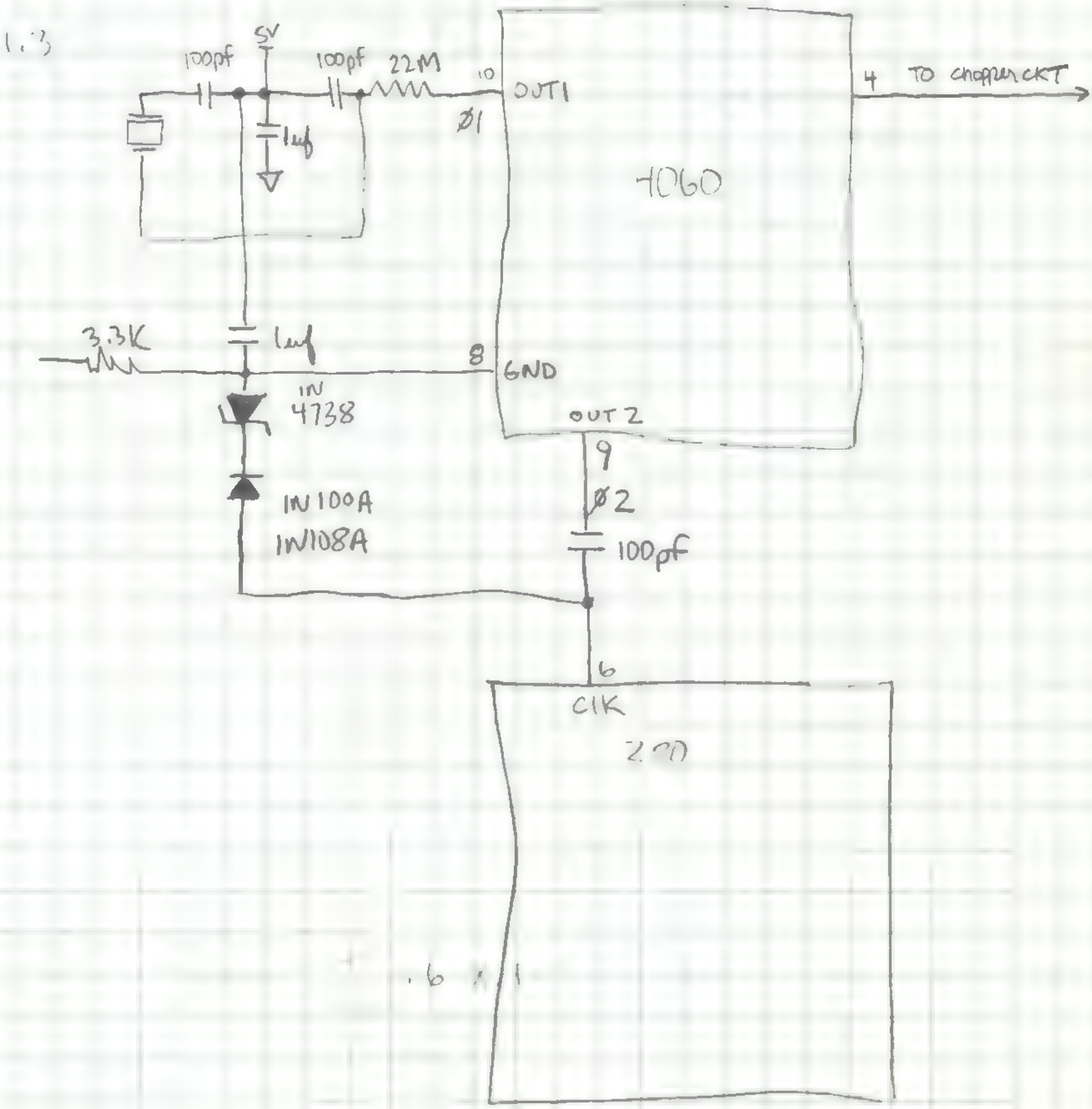
Half Carry Flag Used by the DAA instruction for BCD operations.

Add/Subtract Flag Indicates what type of instruction was performed most recently so that [illegible]

1.8, .95


+5V
820
.022uf
1K
To
Pin 4
4060
Q2
+5V
+5V
Q2
+5V
1K
10
330
-10V
-24V
10
1uf
.1uf
1N
4732
63V
5V
1uf
8
4060
3.3K
4738
825127
Z80

1N58154 - 40 pin
Z80A 40 pin 24
2716 - 24 pin
SEL 83079 - 16 pin
4556 - 16 pin Dual binary 1 of 4 active low outs



~~2.25~~

2.3 , .5 .7 Ø

10 - 16

6.4 = 4.2

5.7

2.8

11 - 25

1.5 - 10

1.15

2.95

Computer

43 Pin card edge conn.

	Solder side		Comp Side
A	[illegible]	[illegible]	
B-C	+5 ([illegible])	[illegible]	
D	+12 not used		
E	Speed 15/30		
F	GND		
H	A4		
J	A5		
K	A6		
L	A7		
M	Foot store lamp		
N	~~[illegible]~~ [illegible] lamp		
P	prog select lamp		
R	start lamp		
S	B0		
T	B1		
U	B2		
V	B3		
W	B4		
X	B5		
Y	B6		
Z	B7		
	Deck ground (logic [illegible] + 1.4V) to TIP 127 Emitter, collector to deck		
	Play		
	Rewind		
	Fast Forward		
	C0		
	C1		D1
	C2		D2
	C3		D3
	C4		D4
	C5		D5
	C6		D6
			D7
	count (tach)		
	DIR		
	Step		
	GND		

REF. #
ON
SCHEMATI

Light from led A1, biased by R6 (R1 & R2 no longer used) goes through tack generator disc into photo transistor (A1), through cap C1 to transistor Q 32 and into Q 33. 4 5

Signal then goes through C2 to coincidence counter Q34 and Q35, which eliminates spikes. (Wave Schaper) 6

Signal then goes to frequency doubler Q36 and Q37 which doubles 480 Hertz to 960 Hertz @ 15 ips. The output is labeled (#7) on print. 6

Here the signal splits;

#1) one side goes up to countdown circuit IC-#1 10

#2) and other side goes down to the converter 8

#3) input to anti-hunt circuit 19

The 960 Hertz signal goes to test point A thorugh buildout resistor R8.

The 960 Hertz signal goes to the frequency to volts converter (right board in card pin S and through C15 to Q11 where a precision capacitor C16 is charged. This is the saw-toothed wave form generator. 8

The discharge rate of C16 determines the place speed of the machine and is controlled by the three sets of resistors R28, R29 for 60 ips, R30, R31 for 15 ips and R32, R33 for 30 ips. Each of these are to ground through

~~selector switches~~.

The signal then goes through a two-stage low-pass filter network Q30 and Q31 which eliminates high frequency spikes. (22)

The output of the lowpass filter produces an error signal of varying DC level which feeds Q12, one half of differential amp Q12 and Q13. (9)

Ref page 4 The other half of the differential amp Q13 receives its input from the phase detector via the VSO. The differential amp has a capture range of +/- 5%. (9)

The output of the differential amp , pin Z - card 164, then through pin F - card 163 and feeds the preamp transistor Q15 which drives Q16, the motor transistor, and the takeup motor. (14) (16)

Reference C15, line 3E goes to card 164 pin A and then up through R82 to point 6B. This is the input to Q25. (20)

When the tack generator is running Q25 is shut off. This also shuts off Q27 so that the tape lifter is inhibited. When the tack generator has output (Tape running). . (20)

However, when in rewind or fast-forward, Q26 turns on, which

~~Q25 has many inputs~~;

Q25 has many inputs;

#1) a 960 Hertz recognition input from the tack generatorc. 20

#2) a DC inhibit signal from the load switch through CR25.

When the VSO is in the sync position, not normal run mode, it bypasses the output of the phase detector and uses a resistor network which supplies a DC voltage.

These two voltages are summed at the output of Q12 and go to the input 14
of the servo amp, Q15, Q16 and the take-up motor.

The anti-hunt circuit, Q14, shuts down the counter when the machine is in 19
the stop mode. This keeps the tape lifters from operating when the capstan is made to rotate. It also keeps the motors from turning.

20

A 960 Hertz signal out of the reference line (7) also goes to the tape lifter circuit. It enters Q25 and goes to Q27 which activates the tape lifter solenoid.

After stop button is pressed the tape lifter will not de-energize until the tack wheel has stopped.

The anti-hunt circuit is Q14 . As more current goes through the take-up motor, Q14 goes more negative.

Q26 is the play transistor and is on when play button is pushed, which turns off Q27 and turns on Q13 which turns on the pulling motor servo and relaxes the feed motor servo.

The phase detector receives its input from the countdown chip.

the countdown chip IC-1 has its input from the 960 Hertz tack generator. its output is a divide by 16, 32, or 64. The two outputs not needed are grounded by the speed switches. The divide by :

16 is for 15 ips,
32 " " 30 ",
64 " " 60 ".

The phase-locked loop is not yet understood.

The output of the coutdown chip goes through Q7 also

A 60 Hertz line reference signal through an isolation transformer goes through Q4 , is shaped and filtered and joins Q8 through CR3. Q7 output also goes to Q8 and also goes up to Q6 through a RC filter net (possibly 60 Hertz) and is summed with the output of Q8 and then is smoothed by C14. This signal goes to the VSO and then to the differential amp Q13.

The phase detector output feeds the meter through Q9.

Q18 & Q19 are the rewind and fast-forward circuits.

the supply reel servo has a two-stage preamp Q20 & Q21. The take-up reel servo has a one stage preamp Q15; however it is driven from the output of the differential [illegible] and has more gain there.

The slack pot (200K) biases Q30 which in turn biases Q21 which in turn turns on Q22 the motor XSTR. R74, the 50K holdback tension control ;

#1) biases the input to Q20 which turns on Q21 and then Q22 and provides tension on the feed motor and drops the voltage across R60, the 50 watt five ohm resistor. The voltage drop across the 5 ohm resistor is adjusted to 10 volts and is critical.

#2)

All trasport mode control funtions are turned on by grounding a control line except for Stop. Lift ing everything stops recorder.

C1 — .022
C2 — 1.0
3 — .1
4 — 200mf/25V
5 200mf/25V
6 — .027
7 — .01
8 — 1.0
9 — .01
10 — .015
11 — .015
12 — .015
13 — .047
14 — 4mf/50V
15 — .001
16 — .068 1%
17 — 1.0
18 — .47
19 — .01
20 — .1
21 — .005
22 — .01
23 — .47
24 — .027
25 — ~~.01~~ .1
26 — 35/50
27 — .047
28 — 150/25
29 — 1.0
30 — .027
31 — .1
32 — 200mf/25
33 — 1.0
34 — 1.0
35 — 1.0
36 — 1.0
37 — 1.0
38 — 1.0
39 — 1.0
40 — .1
41 — 35/50V
42 — 8/25V
43 — .01
44.

C46
C47
C48
C49
C51

CAPACITOR
CHART

HIGHEST NUMBER
C43

RESISTOR LIST

R110 - 47K
R111 - 22K

R1 - 10K POT
2 - 1K
3 - 2.7K
4 - 82K
5 - 270
6 - 2K - (not in the circuit any more)
7 - 36K
8 - 1K
9 - 12K
10 - 4.7K
11 - 36K
12 - 12K
13 - 36K
14 - 390
15 - 12K
16 - 12K
17 - 12K
18 - 12K
19 - 1 MEG
20 - 12K
21 - 3.3K
22 - 100K
23 - 340K
24 25K POT
25 - 100K
26 20K TEN TURN POT
27 - 82K
28 4.02K 1%
29 - 5K POT
30 - 24.9K 1%
31 - 7.5K POT
32 11K 1%
33 - 10K POT
34 - 3.3K
35 - 12K
36 - 12K
37 - 12K
38 - 12K
39 - 2.7K
2.7K

R41 40K 1%
42 15K 1%
43 50K
44 4.7K
45 - 1K
46 - 5.6K
47 - 47Ω
48 - 12K
49 - 100
50 - 5.6K
51 -
52 -
53 .47Ω 2WATT
54 4.7Ω 2watt
55 - 15Ω 5WATT 1%
56 - 27K
57 1.8K
58
59
60
61
62 - 27K
63 7.5K
64 270K
65 200K POT
66 - 510
67 - 2K
68 - 15K
69 - 27K
70 - 47
71 - 100
72 - 15Ω 5WATT 1%
73 - 1K
74 - 50K POT
75 - 15K
76 - 1K
77 - 4.7K
78 - 1K
79 - 2.7K
80 - 2.7K
81
82 - 22K

R84 - 12K
85 - 1K
86
87 - 1.2K
88 - 1.8K
89 - 1.8K
90 - 8.2K
91 - 1K
92
93 - 47Ω
94 - 100
95 - 150
96 - 150
97 - 150
98 - 150
99 - 150
100 - 150
101 - 150
102 - 47
103 - 150
104 - 47
105 - 47
106 36K
107 - 1.8K
~~108 - [illegible]~~
~~109 - [illegible]~~
~~110 - [illegible]~~
~~111 - [illegible]~~
~~112 - [illegible]~~
~~113 - [illegible]~~
~~114 - [illegible]~~
~~115 - [illegible]~~
~~116 - [illegible]~~
~~117 - [illegible]~~
~~118 - [illegible]~~
~~119 - [illegible]~~
120 ~~[illegible]~~
121 - ~~200K POT~~
122
123
124
125

NUMBERS NOT USED
51, 52, 58, 59, 60, 61, 8
86, 92

LEGEND → $\boxed{\begin{array}{l} 2N3702 = \text{"02"} \\ 2N3704 = \text{"04"} \end{array}}$

Q38 – 2N3702 – EXT SYNC AMP

Q1
2
3
4 – 02
5 – 02
6 – 04
7 – 02
8 – 04
9 – 02
10 – 02
11 – 04
12 – 04
13 – 04
14 – 04
15 – 02
16 – HEP 36C – OLD NUMBER → 2N6329
17 – TIP 29
18 – 04
19 – 04
20 – 02
21 – 02
22 – HEP 36 C – OLD NUMBER → 2N6329
23 – TIP 121
24 – TIP 121
25 – 02
26 – 04
27 – TIP 29 – NOW IS A HEP S5001
28 – TIP 36 C – TAPELIFTER XISTOR – NEW ADDITION – ON HEATSINK
29 – TIP 30 – POWER REGULATOR ON 310164 BOARD
30 – 02 } LP FILTER
31 – 04
32 – 02 } – PREAMP FOR PHOTO XISTOR
33 – 02
34 – 04 } – COINCIDENCE COUNTER
35 – 4

IC-1
A1 LED DIODE + PHOTOTRANSISTOR ARRAY
SENSOR TECH STRT 850A (MODIFIED)

	PLAY	LOAD STOP	MOTION to STOP	F.FWD	REWIND	[illegible]
A MOTION SENSE	-24V	0	-22 to 0	-22	-22	0V
B "REWIND"	-27.2	-27.3		-26.5	-1.0	-27.3
C B-	-27.2	-27.3		-26.5	-26.0	-27.3
D "LOAD"	-27.2	-27.3		-26.5	-26.5	-.8V
E "FAST FWD"	-27.0	-27.2		-1.0V	-26.0	-27.3
F SERVO IN	-3.0	0V		-7.0V	-1.3	0V
H COL Q16	-26.5	-37.3		-6.0V	-20.0V	-37.3
J BASE Q16	-1.6V	-.09V		-3.2V	-.48V	-.09V
K B-	-27.2	-27.3		-26.4	-26.2	-27.3V
L GND						
M E Q16	-.7	0		-1.6V	0	0
N ANTIHUNT	-17.5	-17.6		-17.0	-17.2	-17.8
P 5 1/2 50 WATT	-29.7	-36.2		-17 to -27	-17 to -27	-37.3
R COL Q22	-29.7	-35.8		START -18 to -46V FULL SPEED	-6 to -16	-37.3
S ATL	-.3	-.3		-25.8V	-25.8V	-.3
T BASE Q22	-.6	-.6V		-.5V	-1.0V	-.3
U GND						
V P.R. CLAMP	-27.0	-23.4		-22.7	-22.7	23.4
W PRE	0	-26.6		-25.5	-25.5	-26.6
X "PLAY"	-1.0V	-27.3		-26.3	-26.3	-27.3
Y NC						
Z GND						

SERVO
RIGHT CARD
310163
16 TRACK
5-19-75

164 CARD
LEFT CARD

			STOP	PLAY ~~START~~	RECORD	REW	FF
1	A		-2.2V STO	-2.1V	70 MVPP (1MS)		
2	B	CHASSIS			(1.2MS)		
3	C	POS OF TACH WHEEL	-5 to -19.6 ~~-18.7V~~ DC	-13.7	4VPP (500USEC)	″	″
4	D		0	-21.3V	.65V 22VPP	″	″
5	E		0	-21.3V ~ -20.03 -20.8 -21.7	″	″	″
6	F	CHASSIS + ~~no connection~~	0	0	0	0	0
7	H		0	0	0	0	0
8	J		0	0DC	13VPP (20MS)		
9	K	SIG was there then disappeared					
10	L	NC	0	0	0	0	0
11	M		0	0	1.7VPP (7MS)		0
12	N	Same SINE IN STOP BUT CLEAN	0	0	0 70MV	0	0
13	P		0	0	1.7VPP (7MS)	0	0
14	R	30V (20MS)	0 [10.7AC]	← Same			
15	S		0.1V	-21.3 to -20.8	22V (500USEC)	21.3 =.65V	21.3
16	T		-21.3	-25.5 3.5VPP -25.2 (500US)		-21.2	-21.2 8V P-P
17	U		-22.0	-16.1V 10VPP -16.1		-21.8 NO AC SIG	-21.8 SIG
18	V	no SIG	-26.3	-25.7	-25.4	-25.1	-25.1
19	W	NC					
20	X		-0.7	-5.5 7VPP (20MS) -5.5		-9 RANDOM	weird square wave 9
21	Y		-15.80	-15.9	-15.9	-15.8	-15.8
22	Z		-0.6	-3.4	-3.3	-4.6	-1.2

24 TK 4-10-… (B)

rec = 8-8 in/sec
SYNC = OFF
PRE = OFF

3-10-75

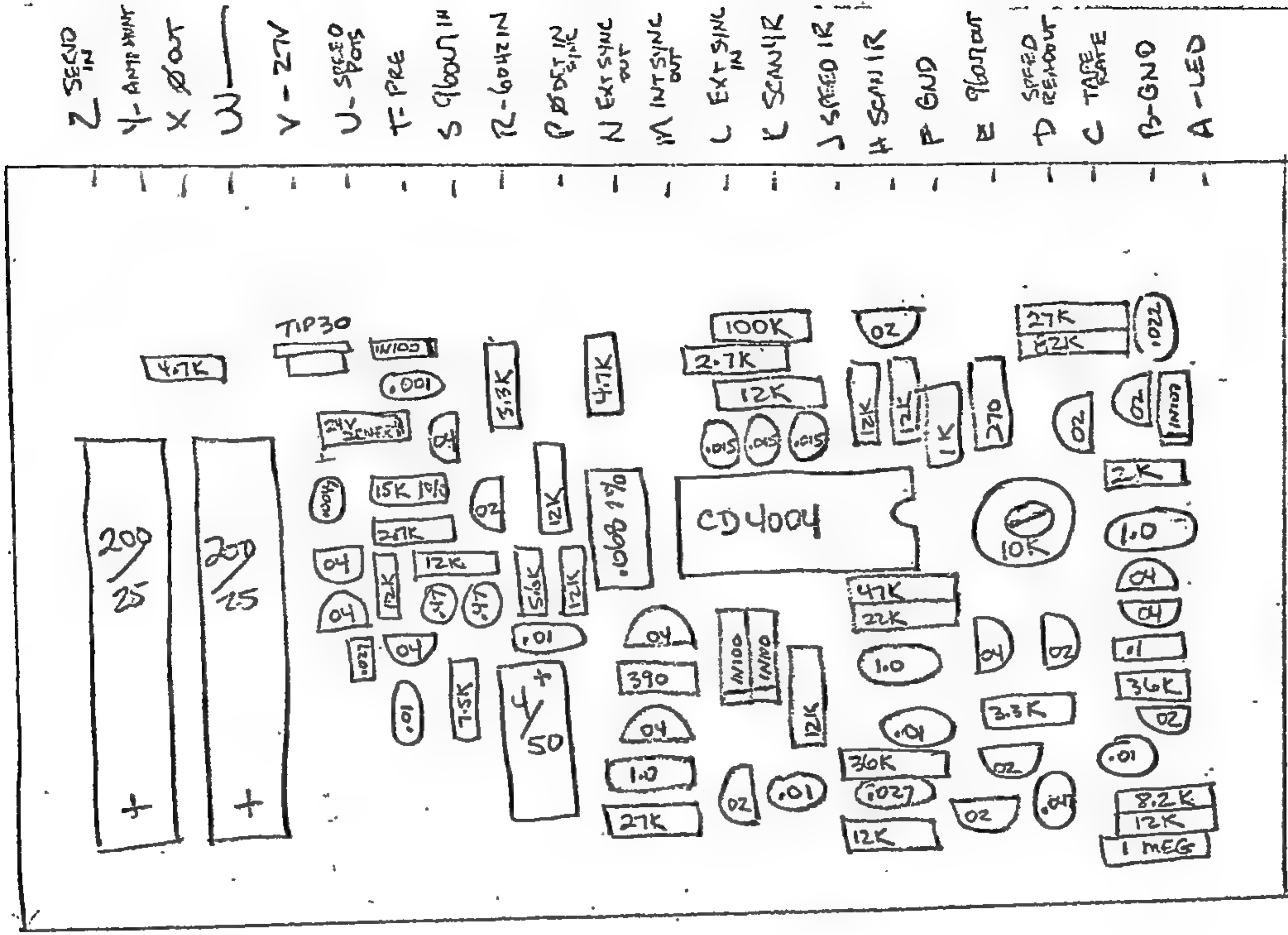
The tach wheel has 192 divisions.
It makes 5 revolutions for in one second
for 960 HZ output. $\underset{\text{DIVISIONS}}{192} \times \underset{\text{REV.}}{5} = 960$ HZ

Reversing idler 1.908" DIAMETER.
5.9942 CIR.

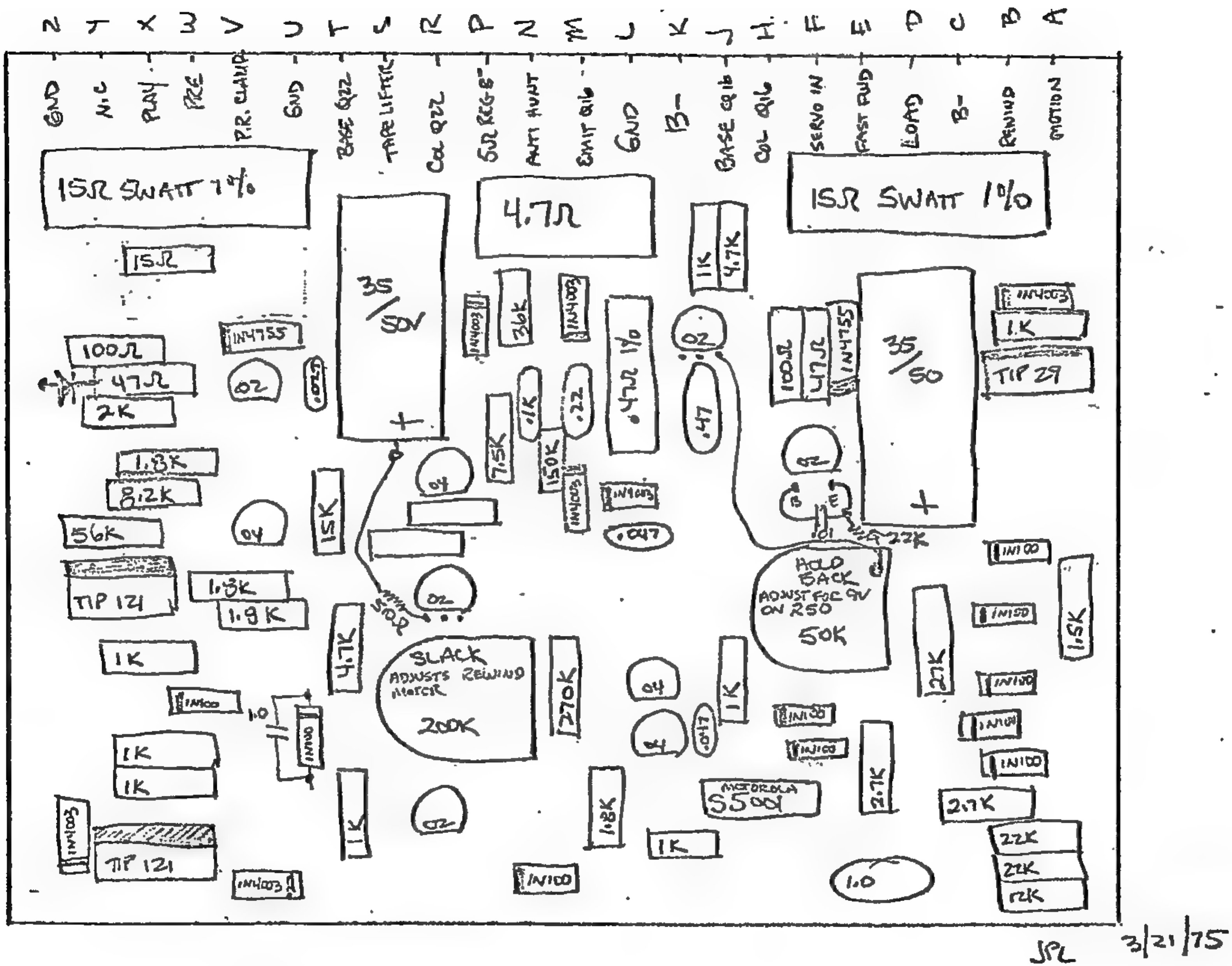
5.9942 X 5 revolutions = 29.971 INCHES

960 cy ÷ 2 = 480 HZ ÷ 192 = 2.5 REV of IDLER/SEC
14.98555"/sec

15"sec X 60 sec X 3 MIN
15 X 180 = 2700" for 3 MIN. TUNE.


Z SPEED IN
X ØOUT
W
V - 27V
U- SPEED POTS
T- PRE
S 9600 IN
R- 60HZ IN
N EXT SYNC OUT
M INT SYNC OUT
L EXT SYNC IN
K SCAN IR
J SPEED IR
H SCAN IR
F GND
E 9600 OUT
C TAPE RATE
B-GND
A-LED
TIP30
CD4004
10K

310164



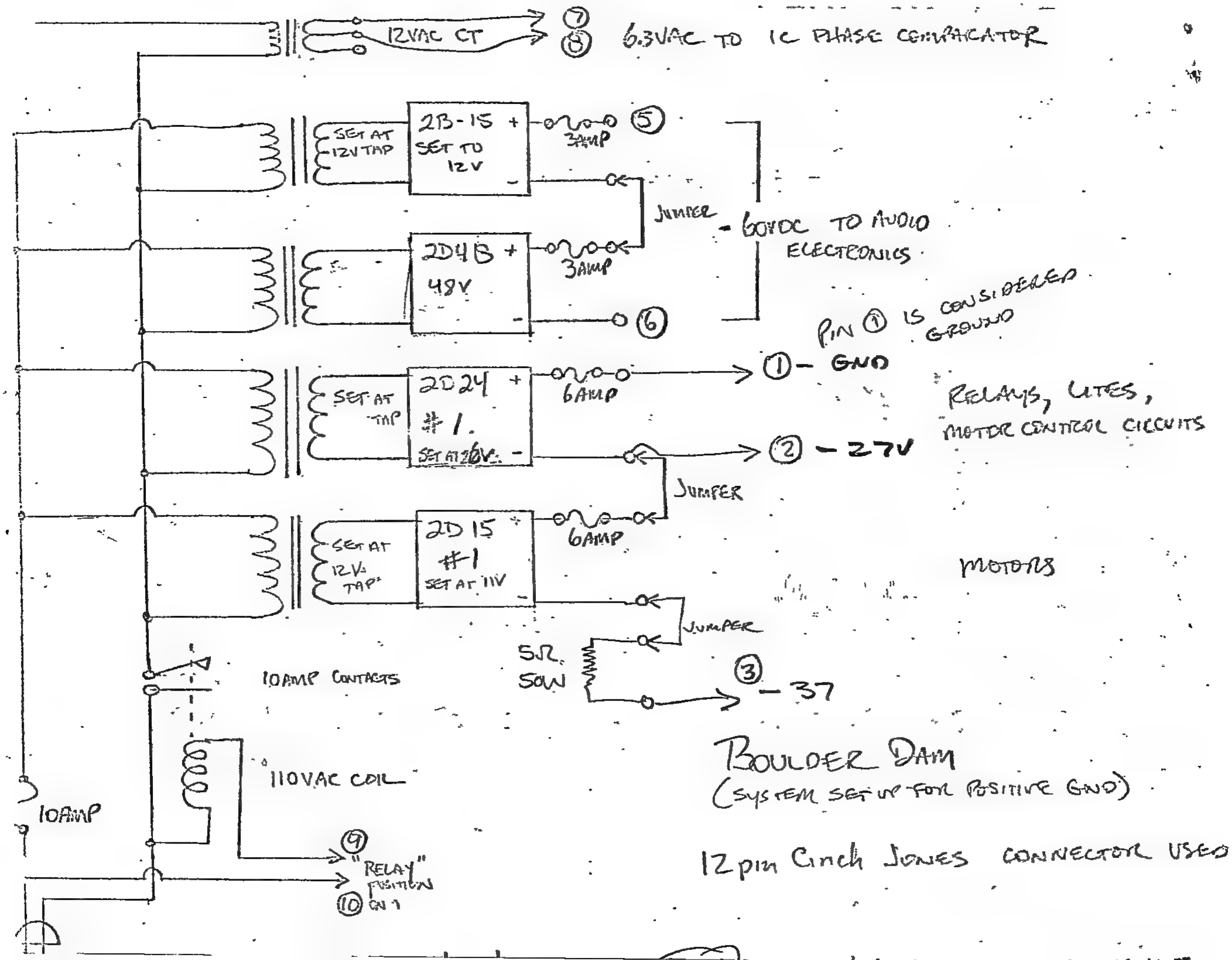
· INCLUDES COMPONENTS ON FOIL SIDE

OLD BOARD WITH ALL UPDATES

310163 SERVO

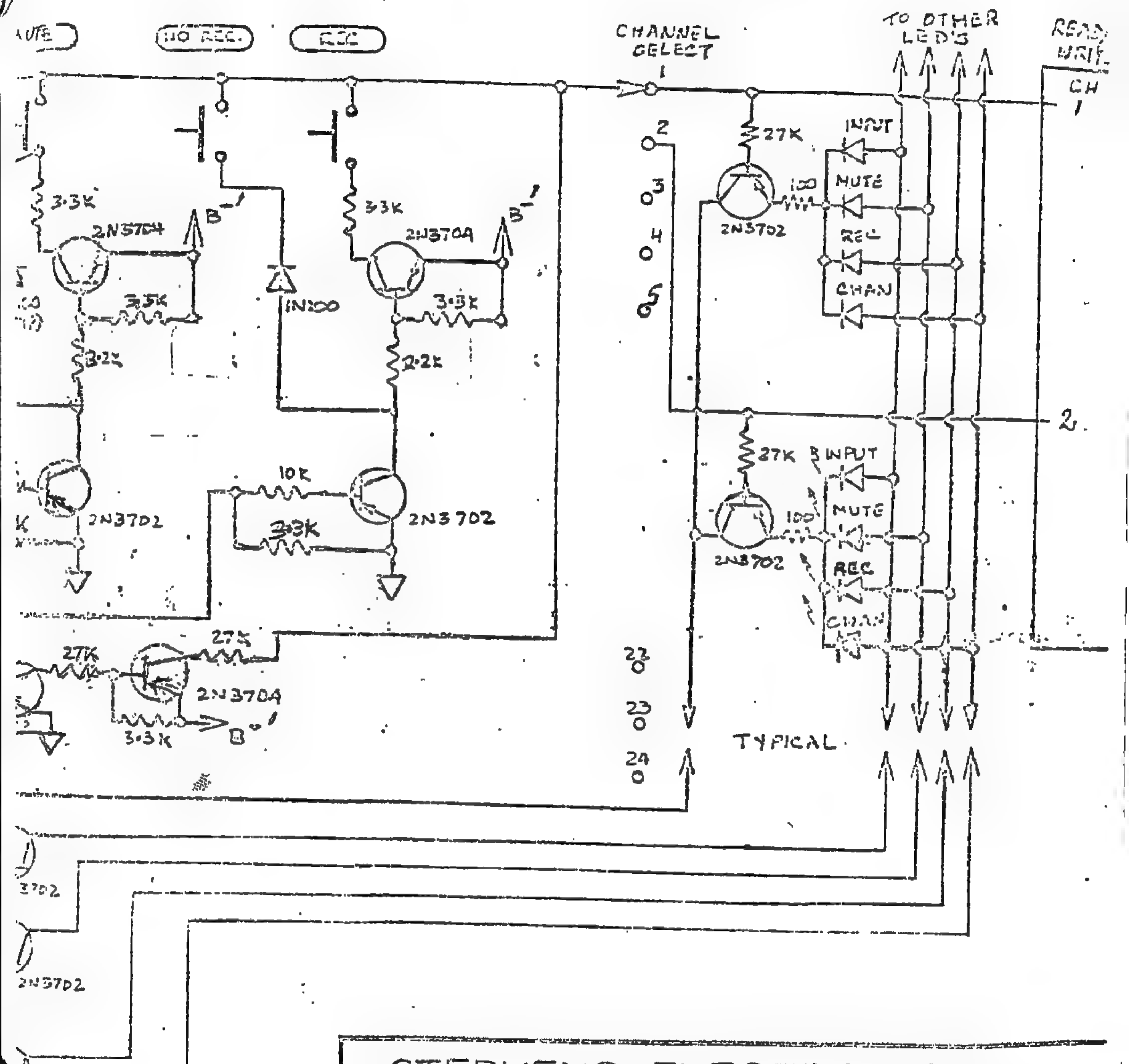
A – MOTION SENSE
B – REWIND
C – B –
D – LOAD
E – FAST FWD
F – SERVO IN
H – TAKE UP MOTOR COL Q16
J – BASE Q16
K – B –
L – GND
M EMIT Q16
N – ANTI HUNT
P – 5Ω 50WATT
R – REWIND MOTOR COL Q22
S – TAPE LIFTER
T BASE Q22
U – GND
V – P.R. CLAMP
W PRE
X PLAY
Y – N.C.
Z GND

SERVO
CARD
RIGHT
310163



BOULDER DAM
(SYSTEM SET UP FOR POSITIVE GND)

12 pin Cinch Jones CONNECTOR USED

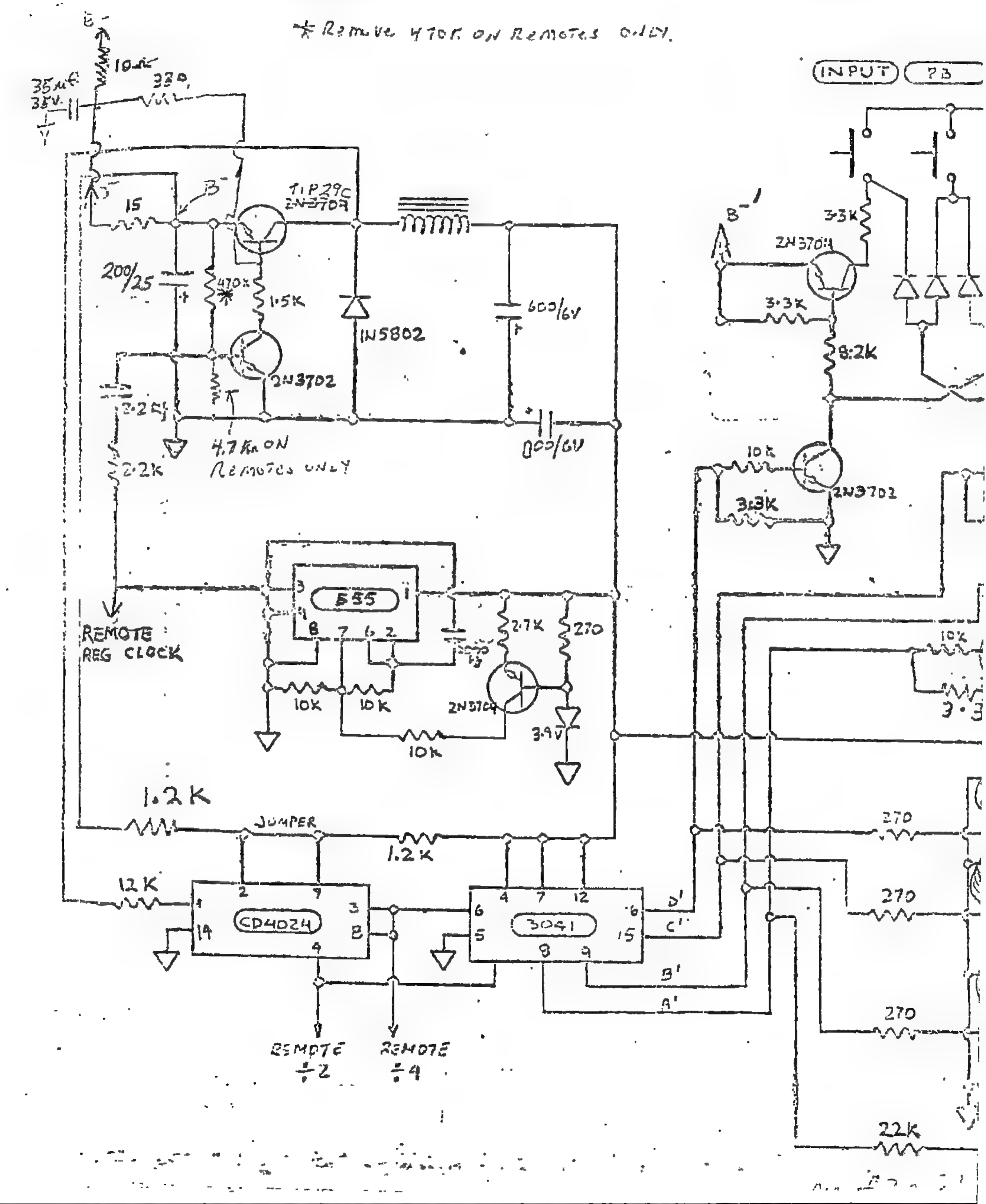


STEPHENS ELECTRONICS

SCALE: ___	APPROVED BY:	DRAWN BY
DATE: 11/3/75		REVISED

MULTIPLEXER SCHEMATIC

821A-24 TAPE ELECTRONICS


* Remove 470K on Remotes only.
INPUT
PB
B-
10K
35µF 35V
330
B-
15
B-
TIP29C 2N3703
200/25
470K *
1.5K
1N5802
600/6V
2N3702
2.2K
4.7K ON Remotes only
600/6V
2.2K
B-
3.3K
2N3704
3.3K
8.2K
10K
2N3702
3.3K
555
3
4
8
7
6
2
1
REMOTE REG CLOCK
2.7K
270
10K
10K
2N3704
10K
3.9V
10K
3.3
1.2K
JUMPER
1.2K
12K
CD4024
1
2
9
3
14
4
B
3041
4
7
12
6
5
8
9
16
15
D'
C'
B'
A'
270
270
270
22K
REMOTE ÷2
REMOTE ÷4

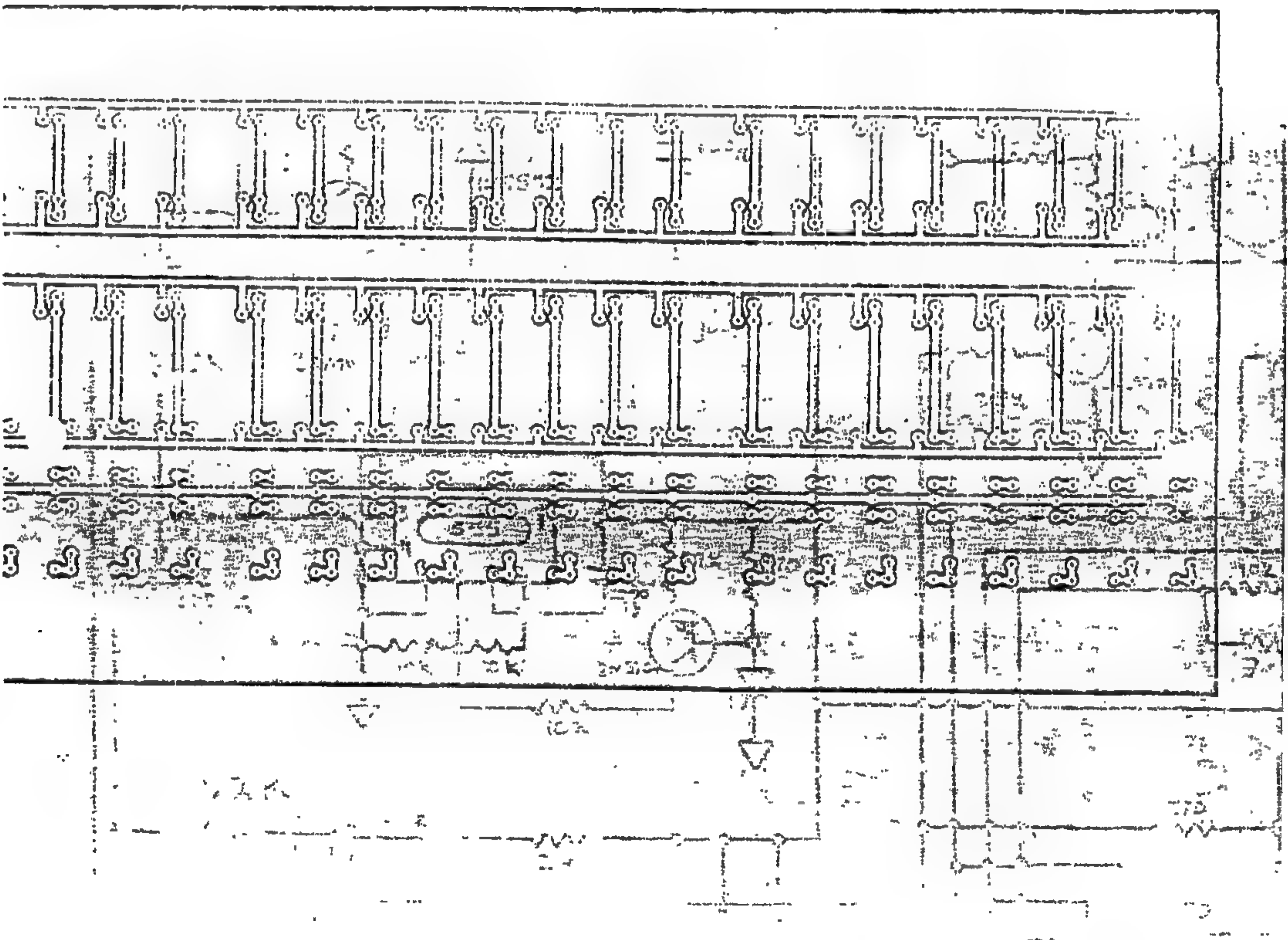
CE ITH 1.2K

OR

NITS ONLY.

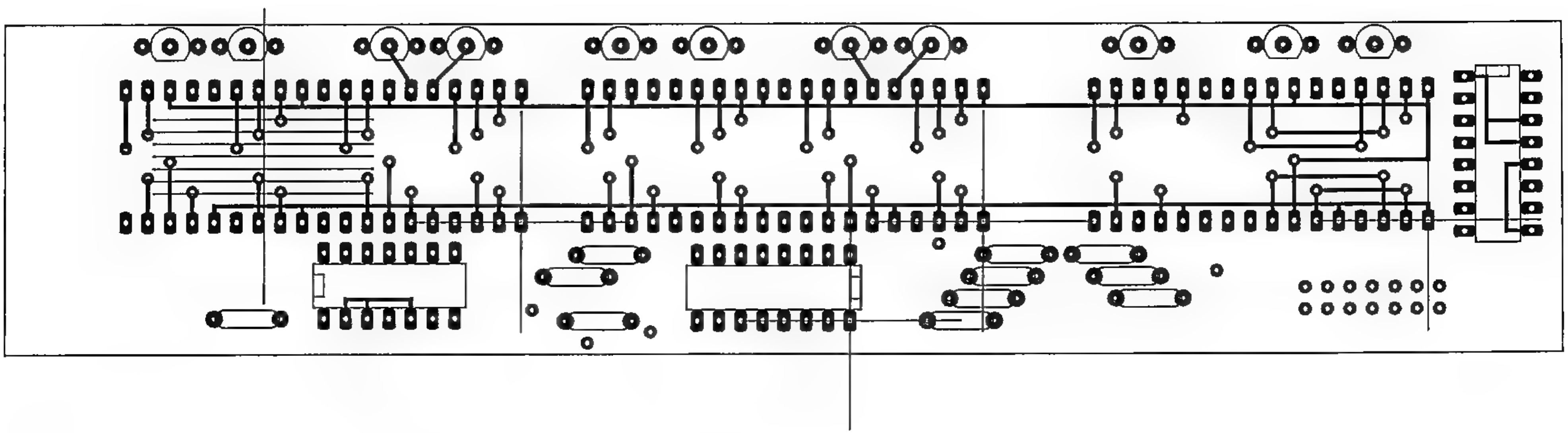
24TRK MULTIPLEX LOGIC BOARD (REAR)

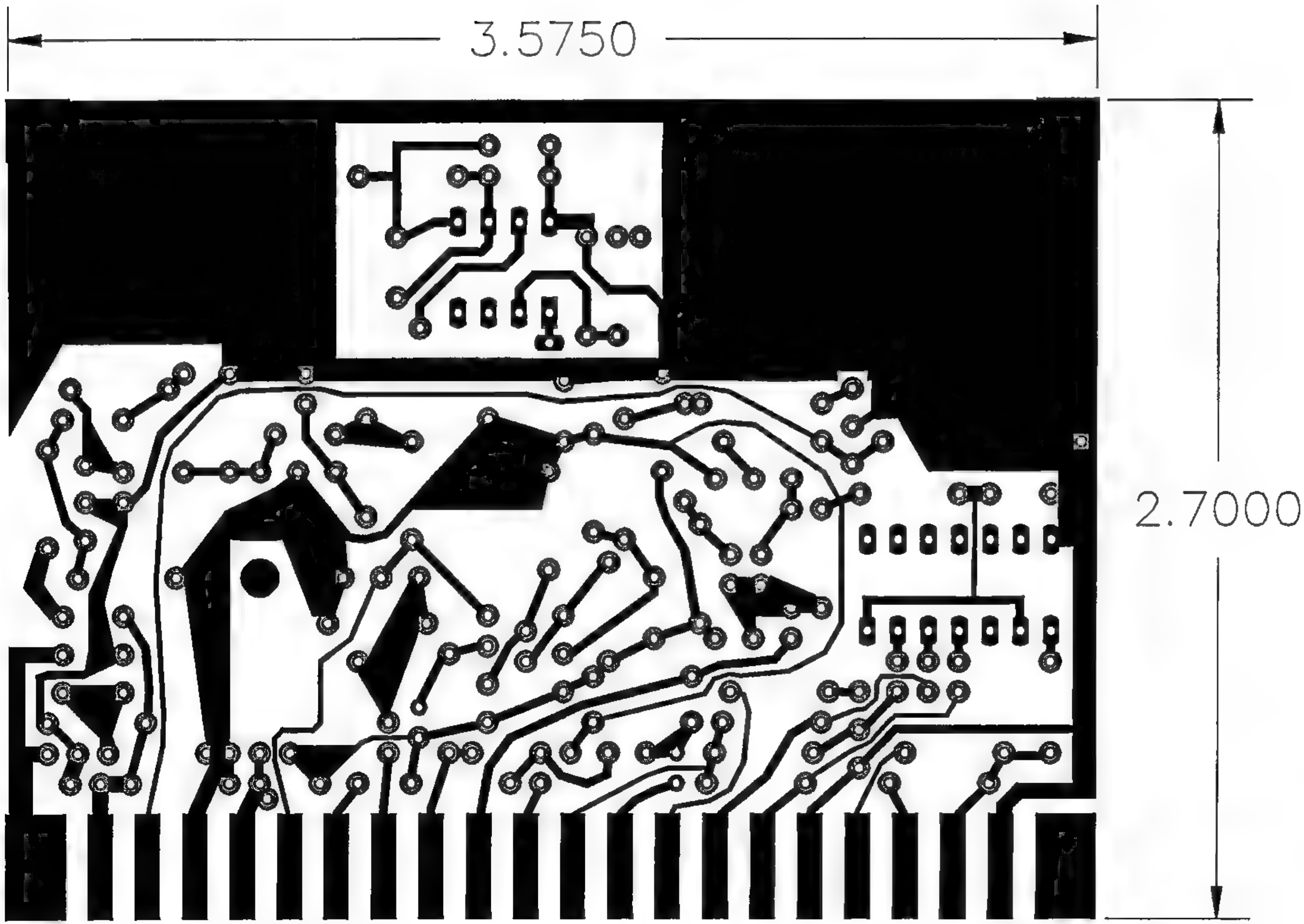
ONTROL FEED TO LINE AMPS



4/8/76
RANDY

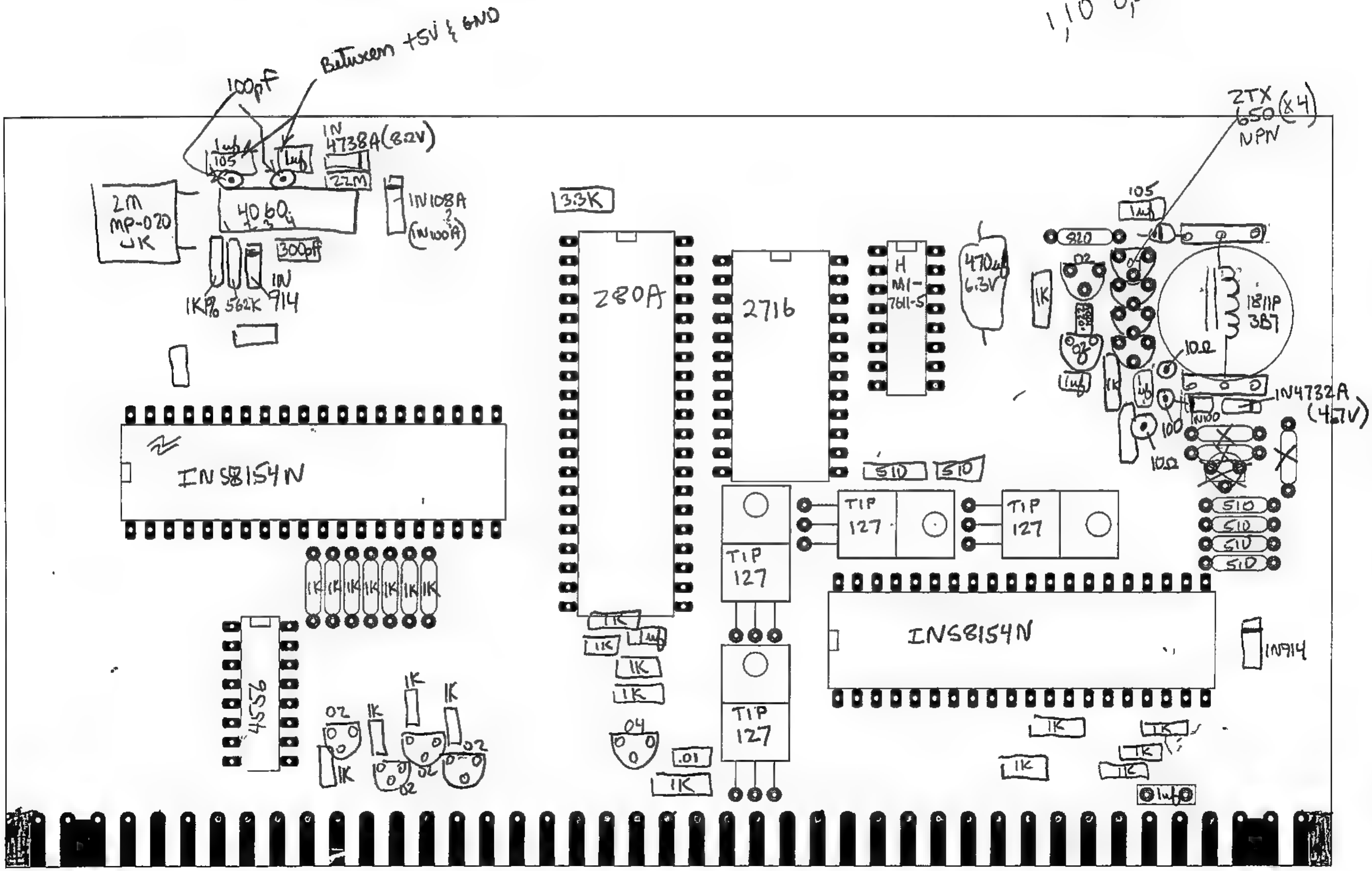
One of two pages

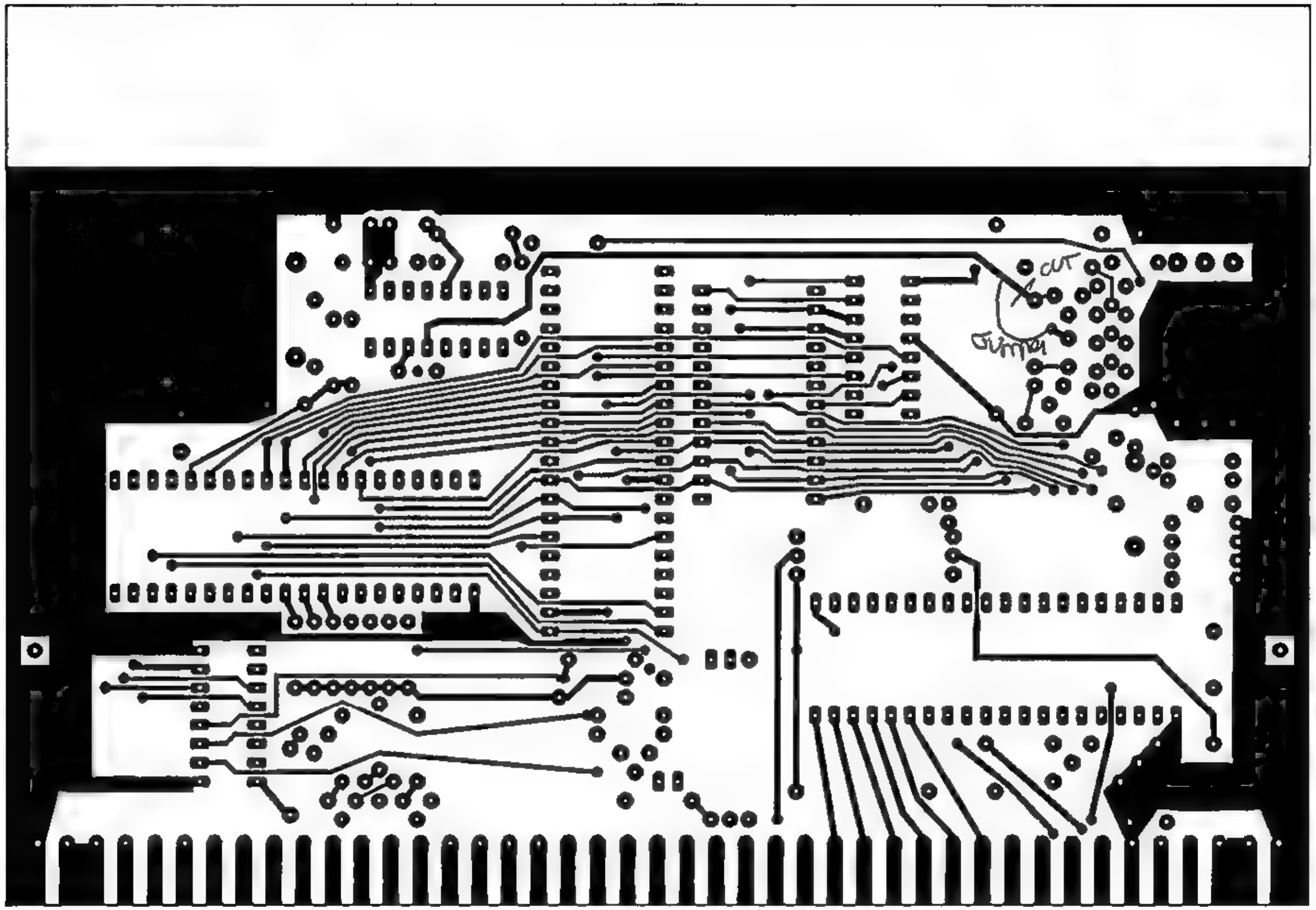



3.5750
2.7000

1500

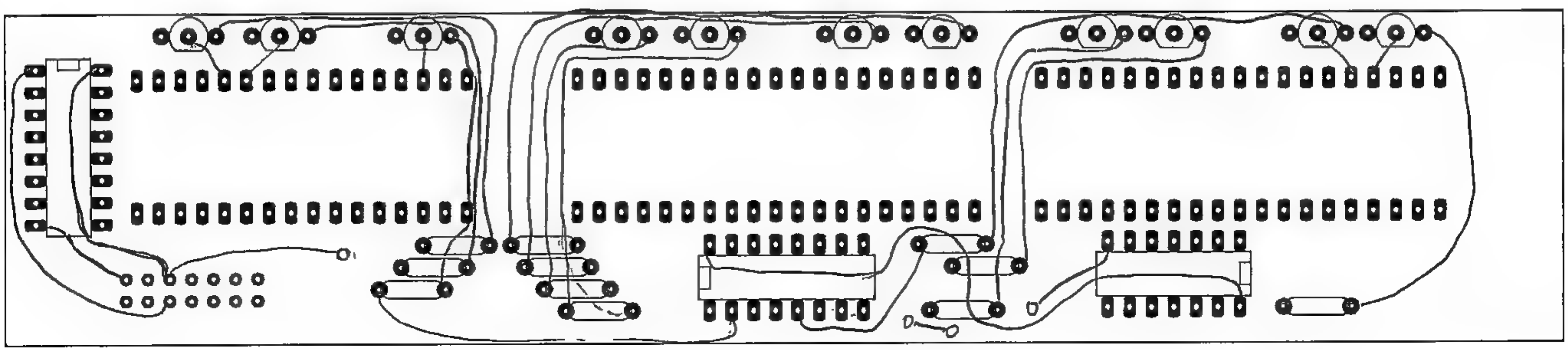
1,10 0,000

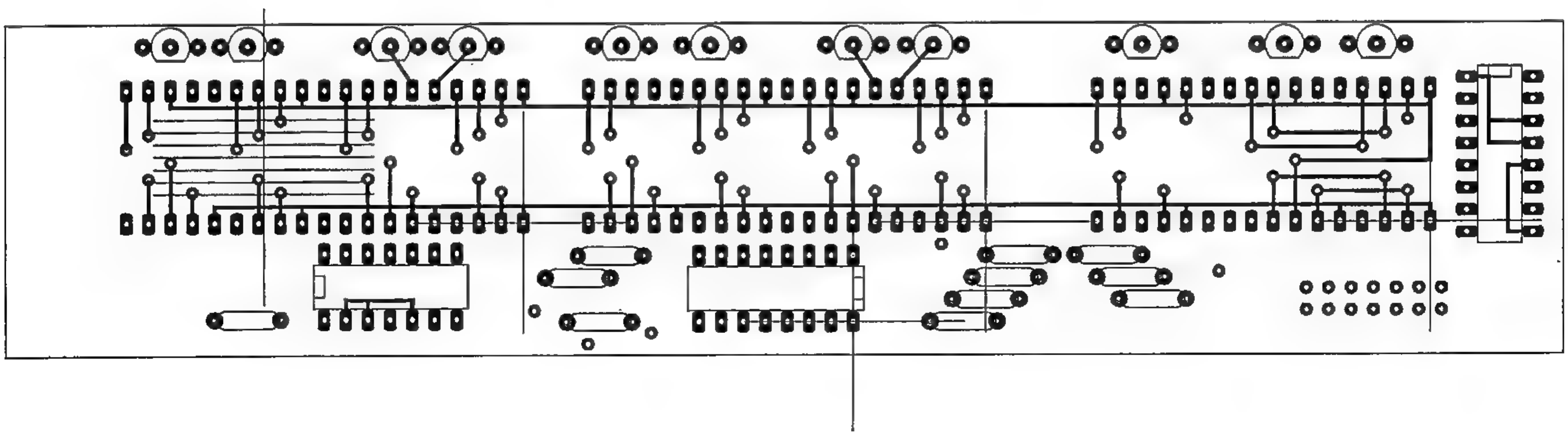


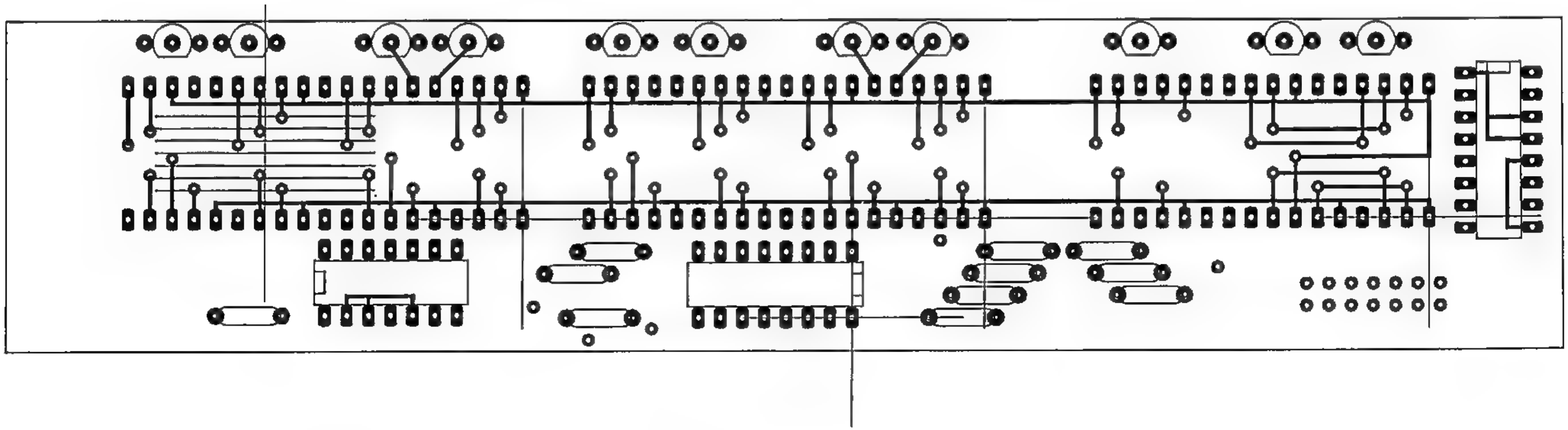


comp side

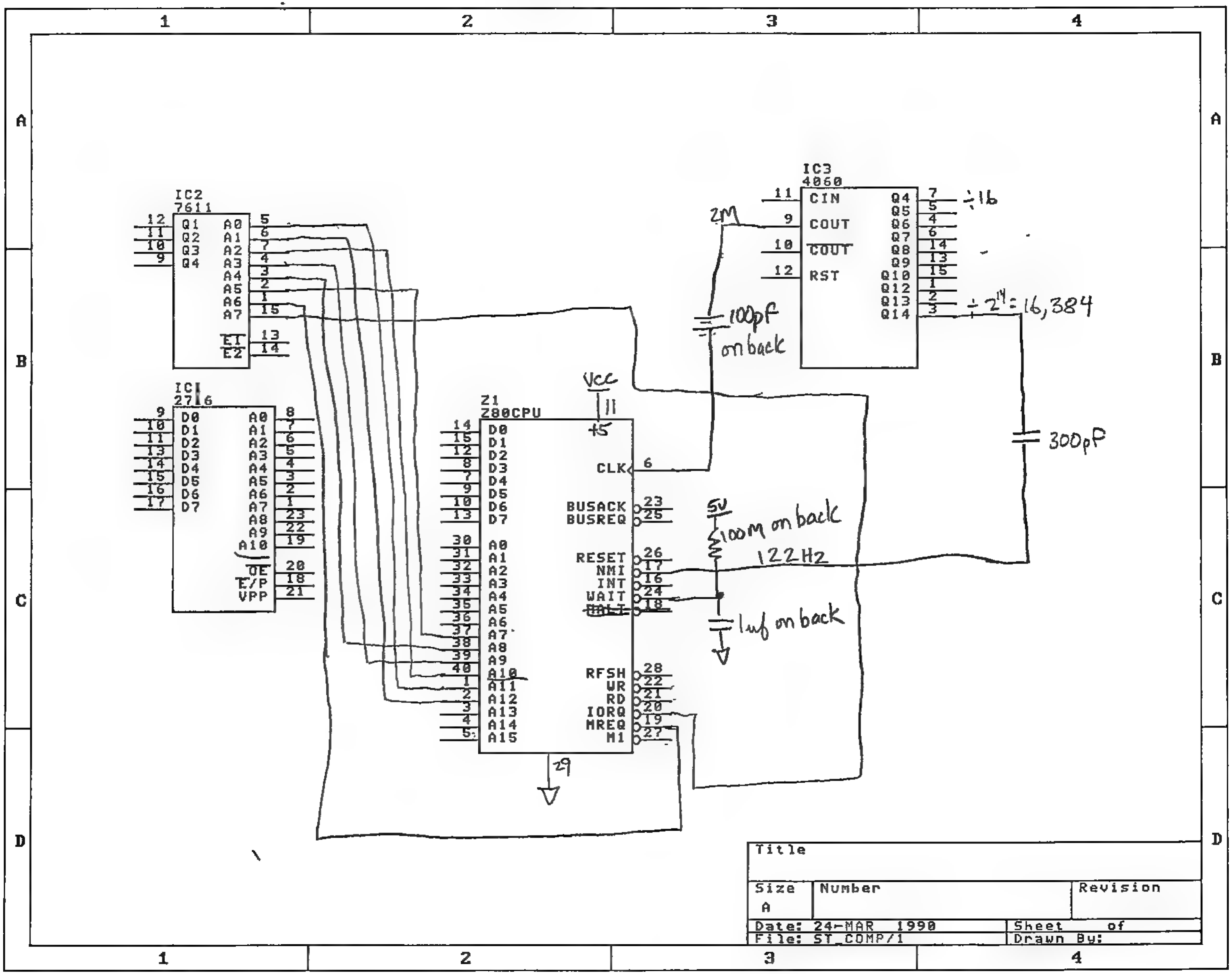
front

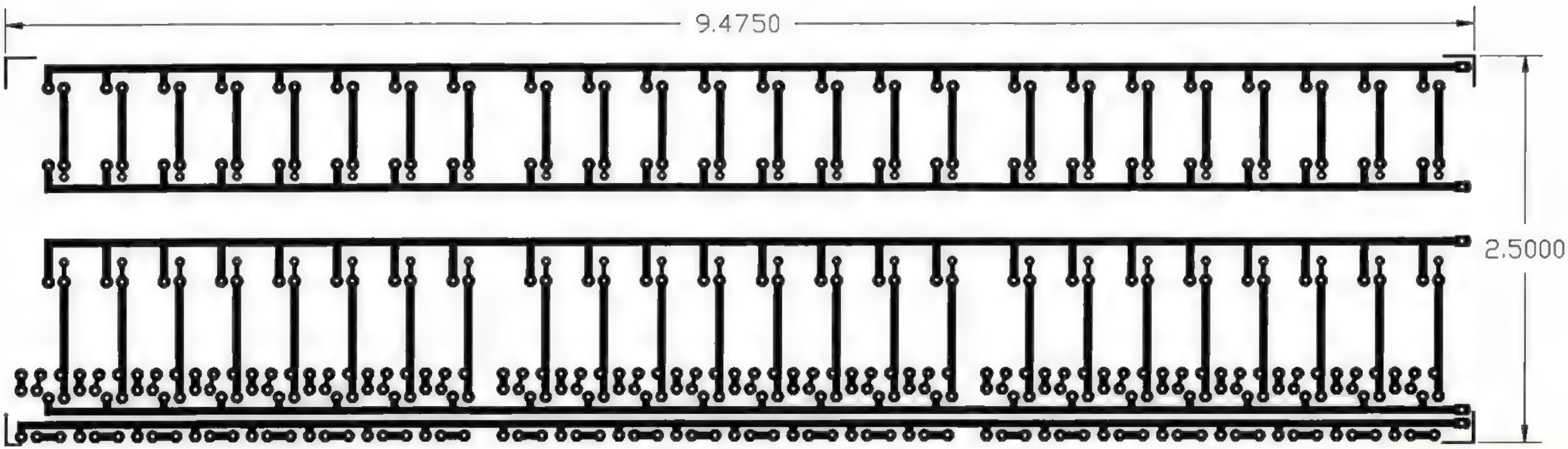


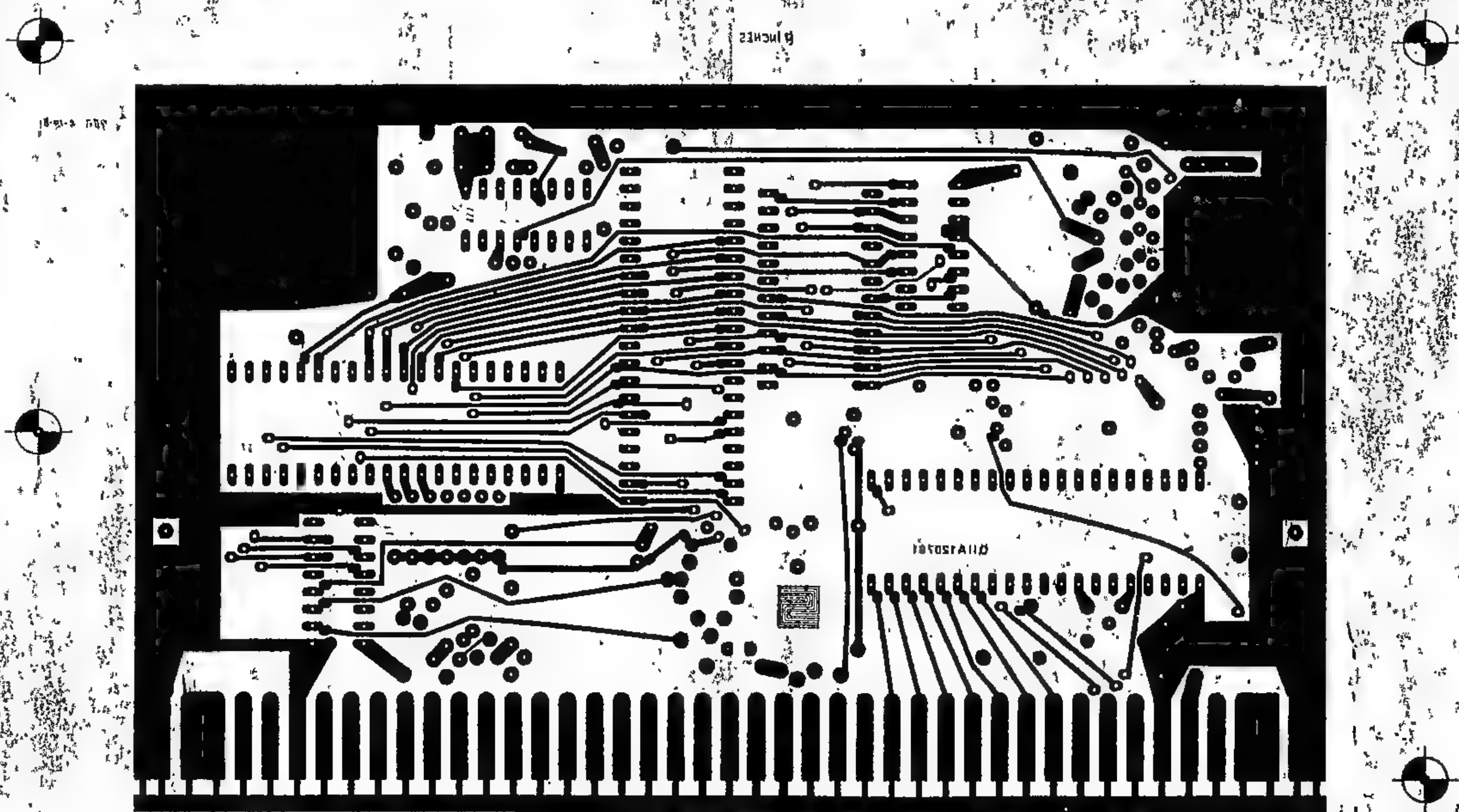


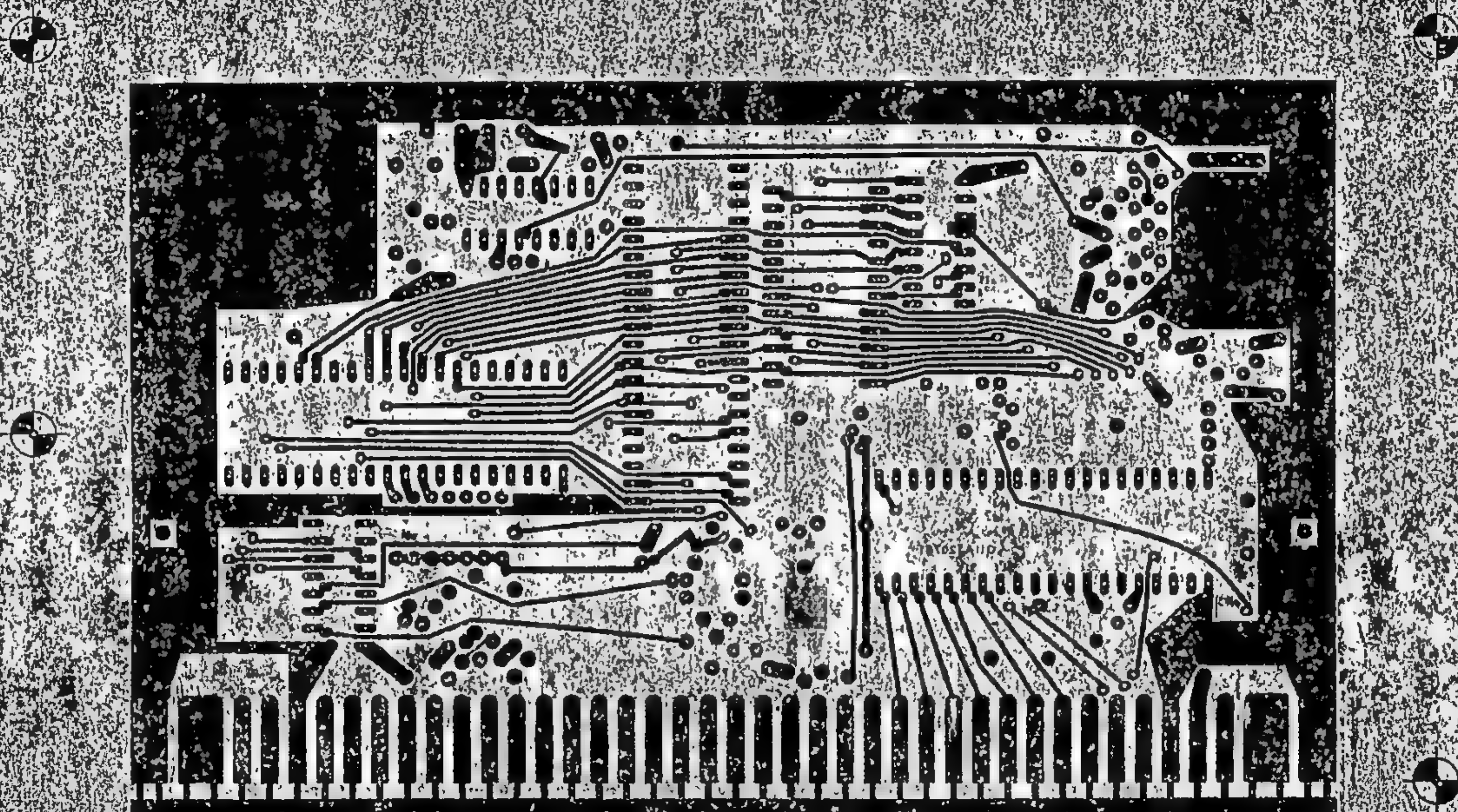


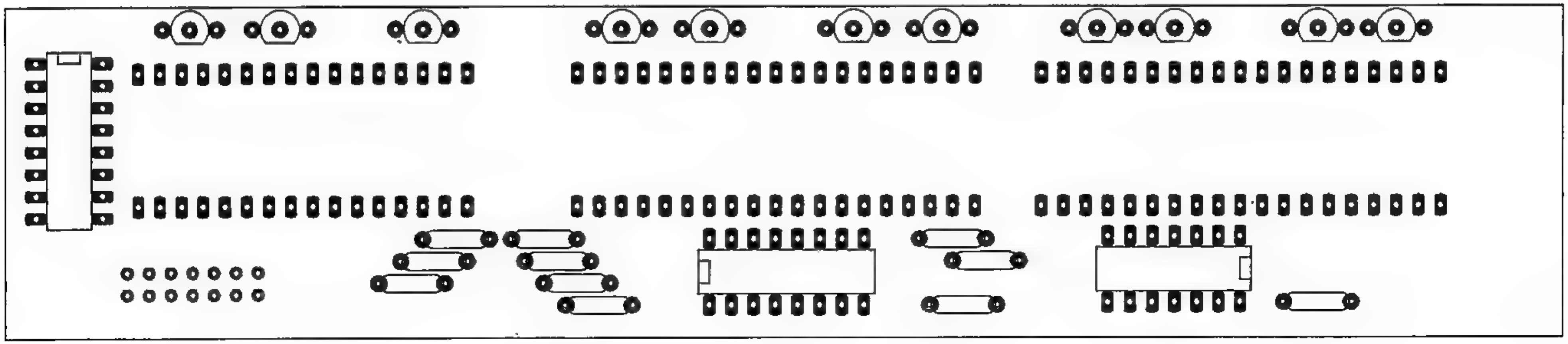
1,85
.85

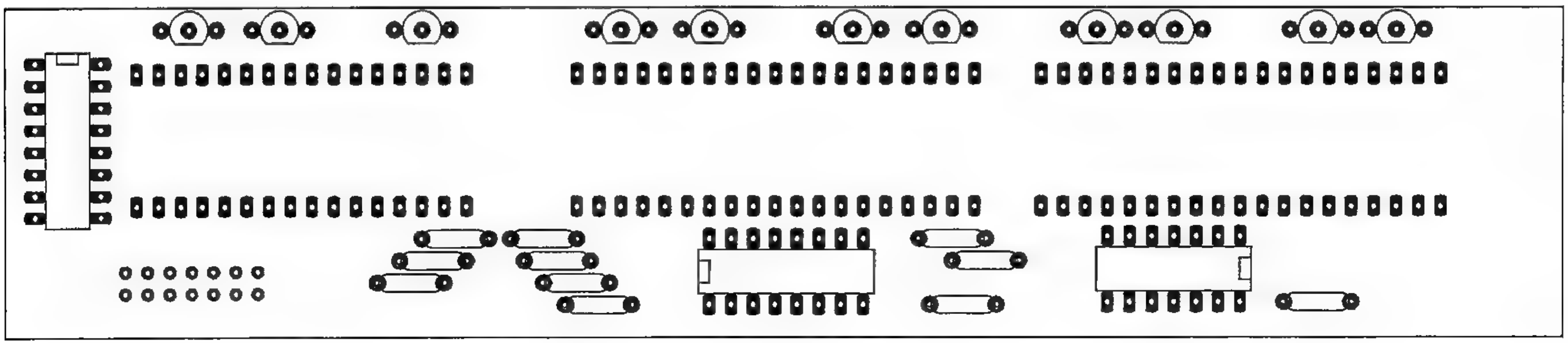

IC2
7611
Q1
Q2
Q3
Q4
A0
A1
A2
A3
A4
A5
A6
A7
E1
E2
IC1
2716
D0
D1
D2
D3
D4
D5
D6
D7
A8
A9
A10
OE
E/P
VPP
Z1
Z80CPU
VCC
+5
CLK
BUSACK
BUSREQ
RESET
NMI
INT
WAIT
HALT
RFSH
WR
RD
IORQ
MREQ
M1
A11
A12
A13
A14
A15
IC3
4060
CIN
COUT
RST
Q5
Q6
Q7
Q8
Q9
Q10
Q12
Q13
Q14
2M
100pF on back
÷16
÷ 2^14 = 16,384
300pF
5V
100M on back
122Hz
1uf on back
Title
Size
A
Number
Revision
Date: 24-MAR 1990
Sheet of
File: ST_COMP/1
Drawn By:

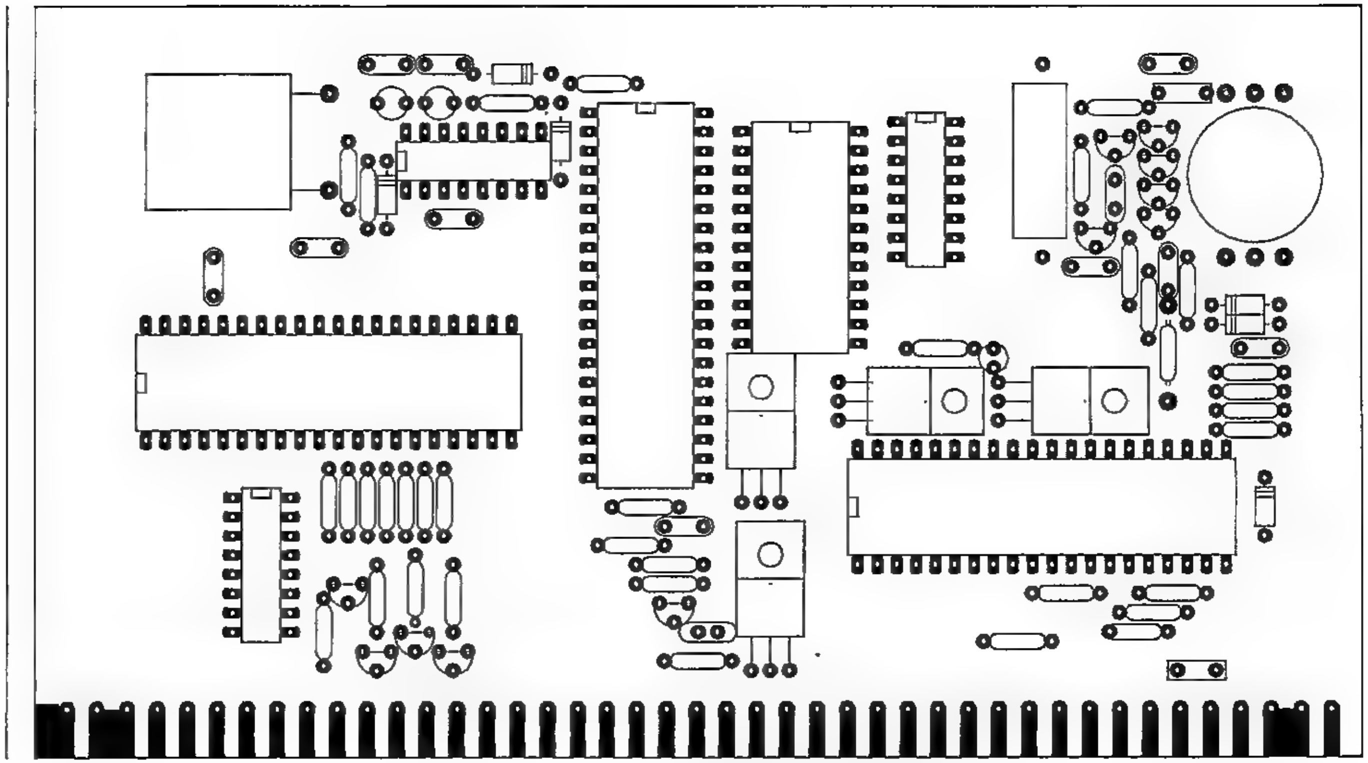

9.4750
2.5000

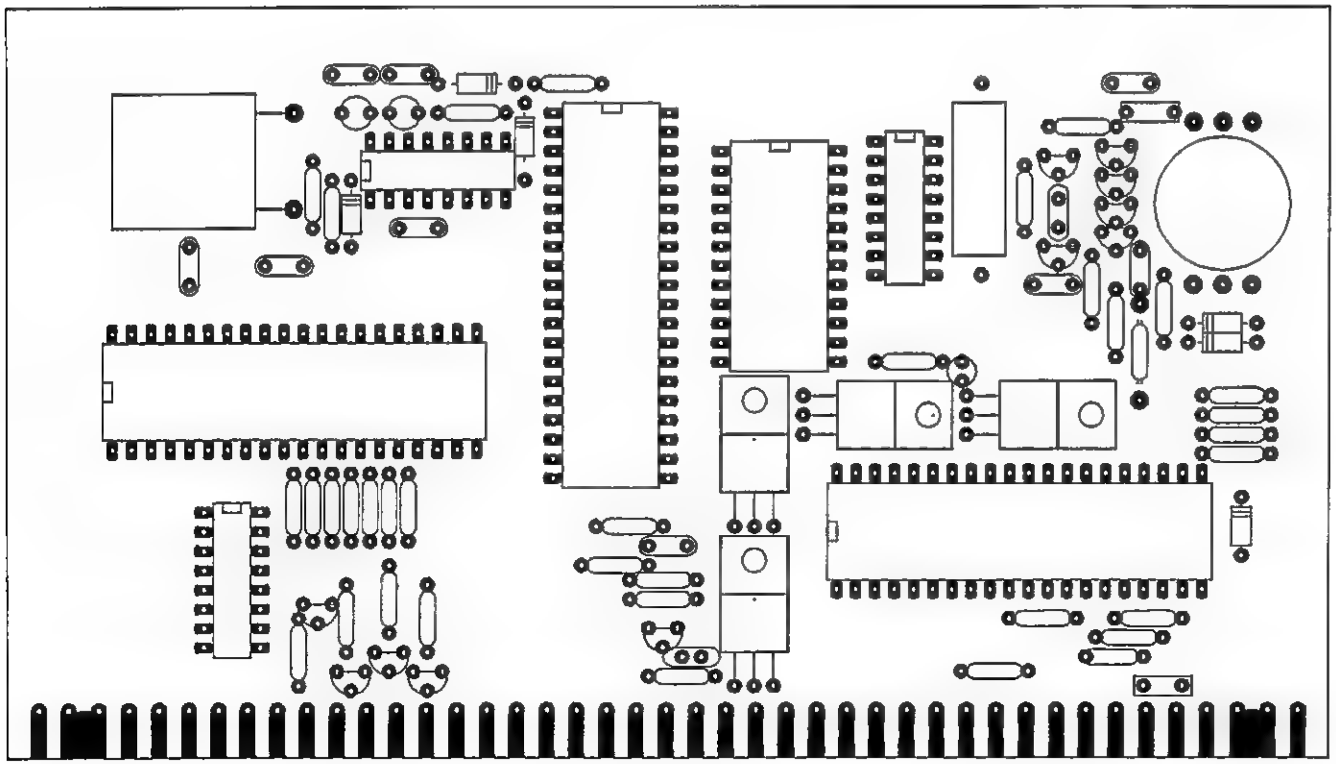




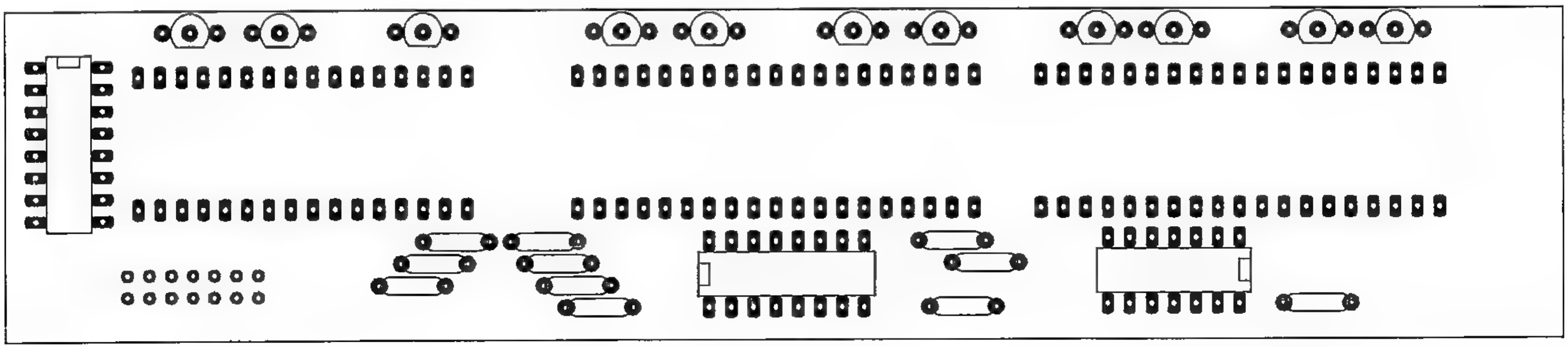




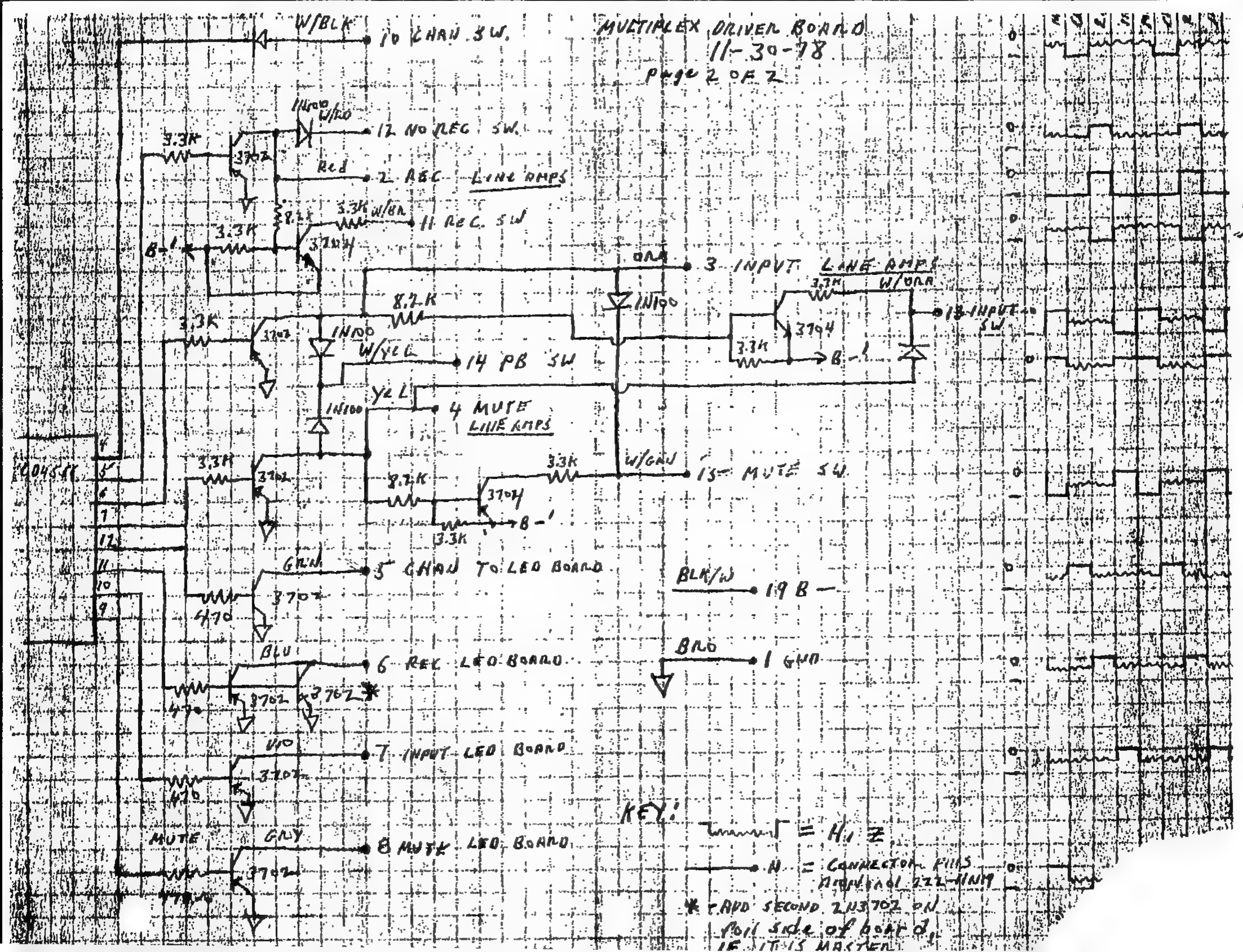




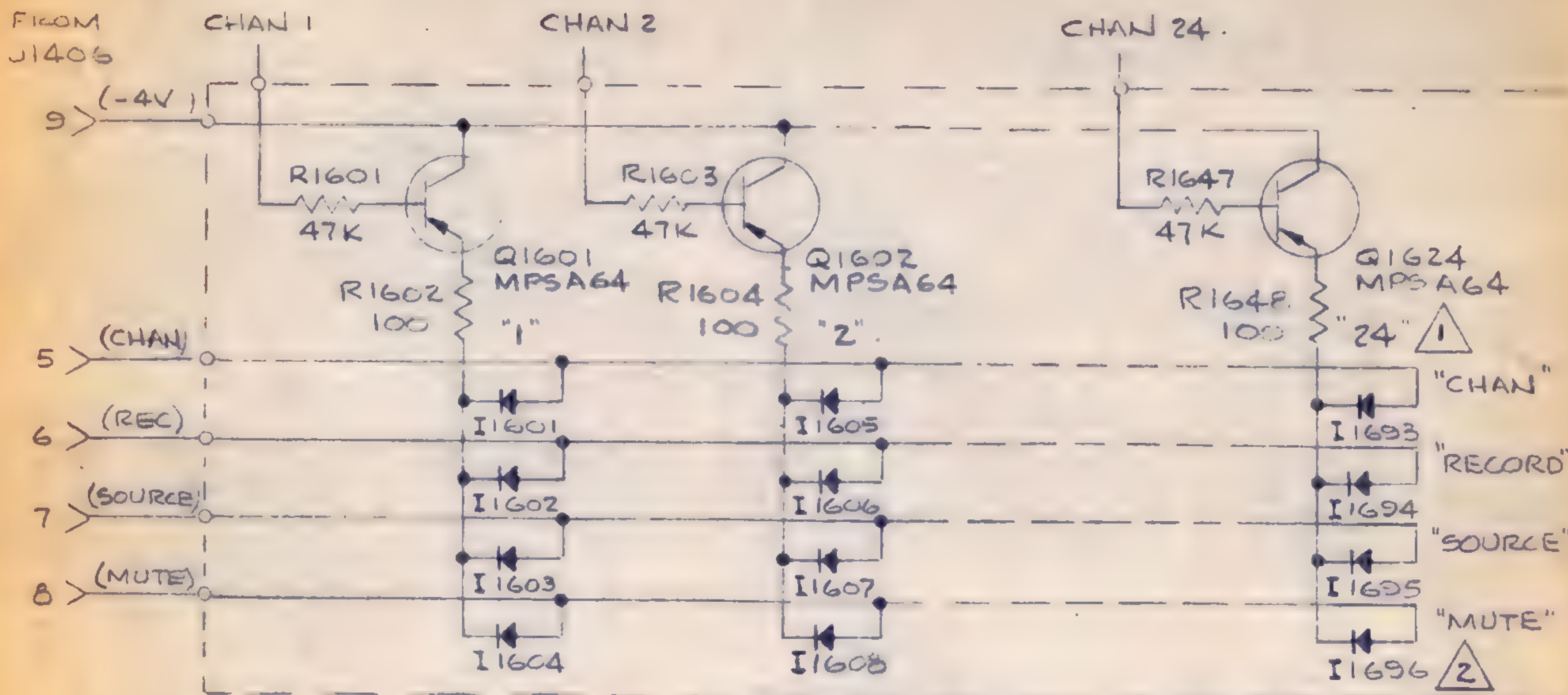
2,65
1,35

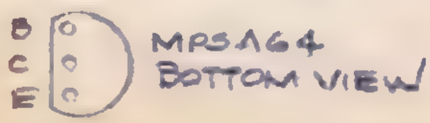


MULTIPLEX DRIVER BOARD
11-30-78
Page 2 of 2



REVISIONS			
LTR	DESCRIPTION	DATE	BY



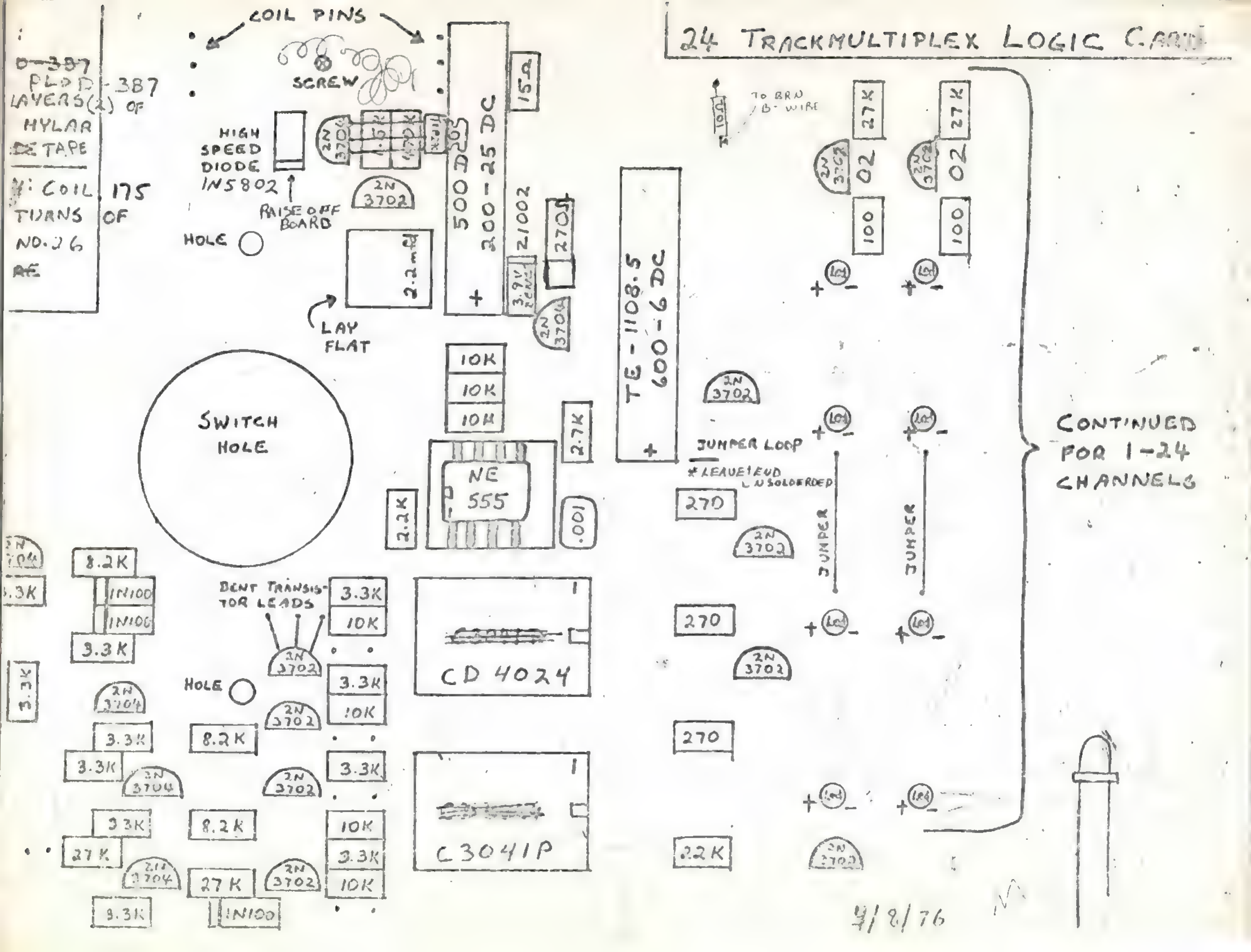


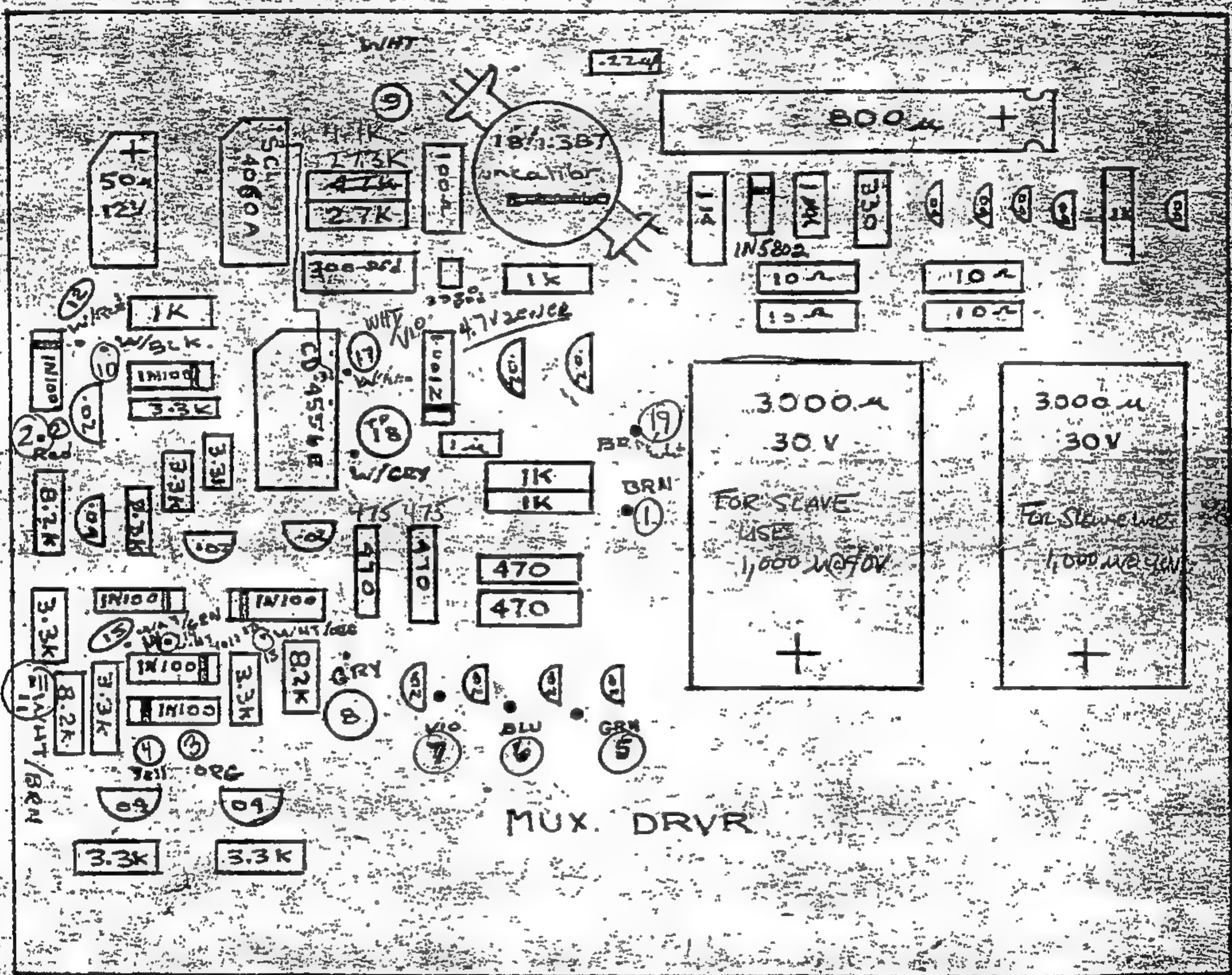
2 LED CARD UNIT SERIES CONTINUES INTO 1700'S FOR 32 & 40 TRACK.

1 24 TRK VERSION SHOWN. LAST NO CORRESPONDS TO NO. OF TRACKS

STEPHENS ELECTRONICS, INC.		
SCALE: —	APPROVED BY:	DRAWN BY GEIER
DATE: 22 OCT 79		REVISED
LED CARD		
MODEL 821-B	FIGURE 6-14	DRAWING NUMBER SC1601

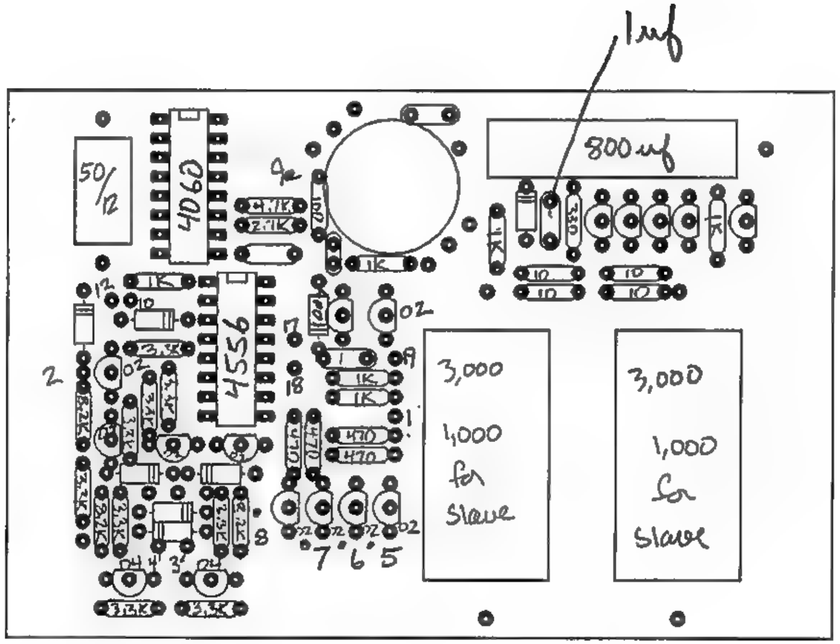
24 TRACKMULTIPLEX LOGIC CARD



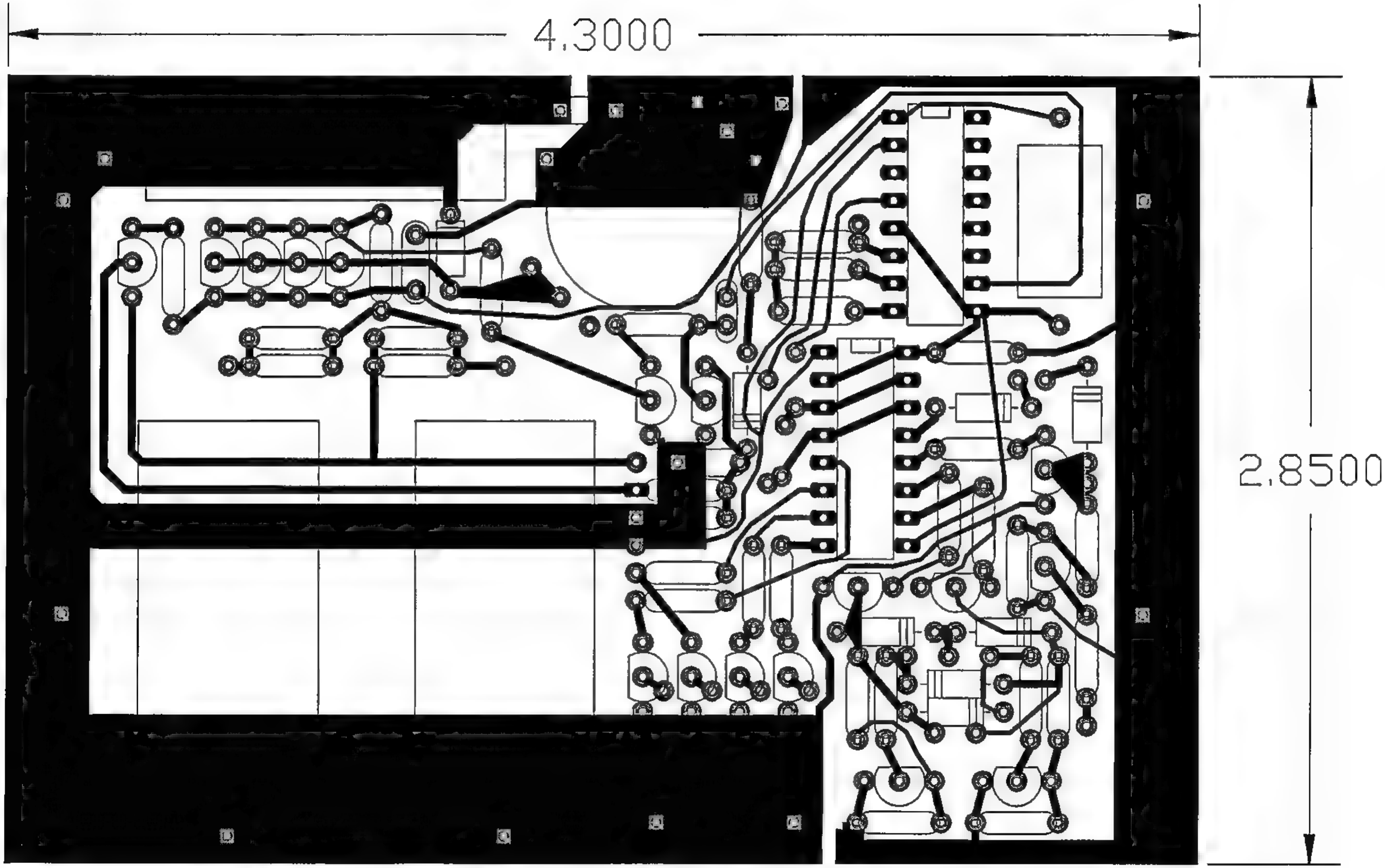


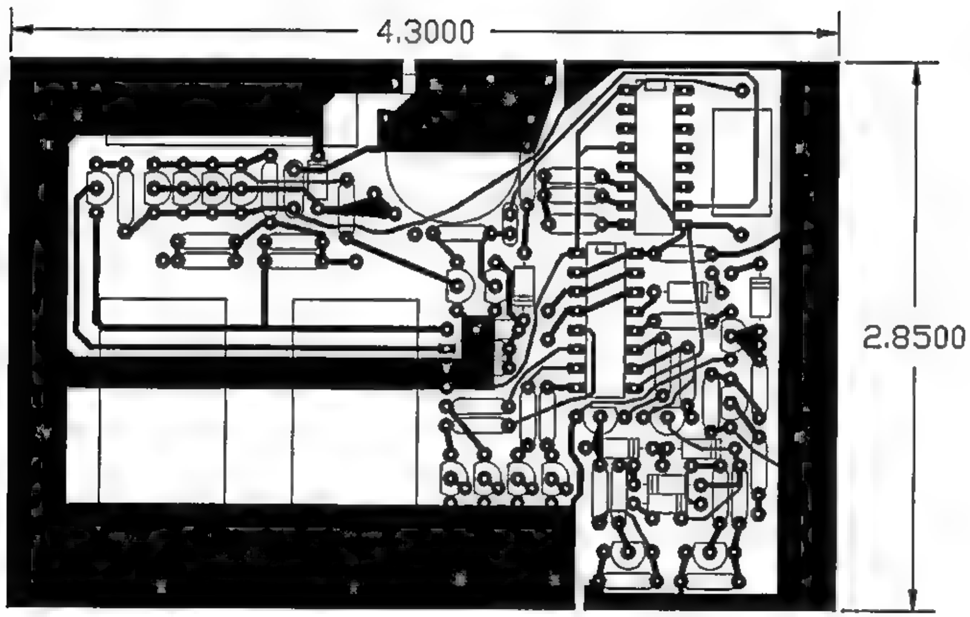
MUX. DRVR
800 µ
3000 µ
30 V
FOR SLAVE USES 1,000 µ @ 40V
3000 µ
30 V
50 µ
12V
1N5802
4.7V zener
1K
470
470
3.3K
8.2K
1N100

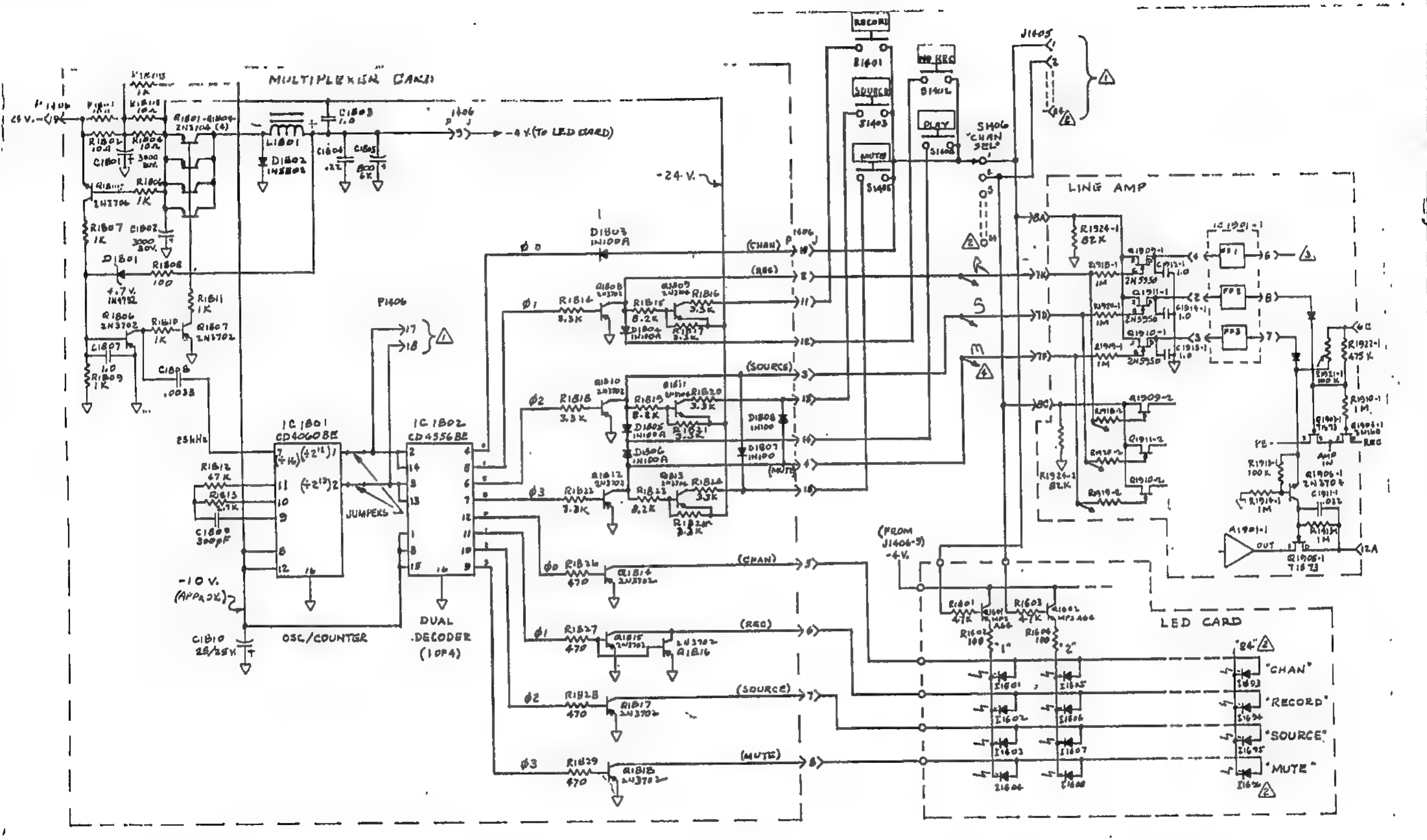
3-16-78


1uf
800uf
50/12
4060
4556
3,000
1,000
for
Slave
3,000
1,000
for
Slave

MUX DRIVER


4.3000
2.8500


4.3000
2.8500



4. THE SYMBOL —→— INDICATES PARALLEL CONNECTION TO ALL LIKE POINTS WITHIN THE SAME UNIT.

3. SEE CONTROL LOGIC DIAGRAM FOR "RECORD" CIRCUITRY BEYOND THIS POINT.

2. 24 TRK VERSION SHOWN. LAST NO CORRESPONDS TO NO OF TRKS. LED CARD UNIT SERIES CONTINUES INTO 1700'S FOR 32 & 40 TRK.

NOTES: 1. TO REMOTE ELECTRONICS WHEN USED.

SCHEMATIC DIAGRAM, MULTIPLEX SYSTEM

PB 7-12-79

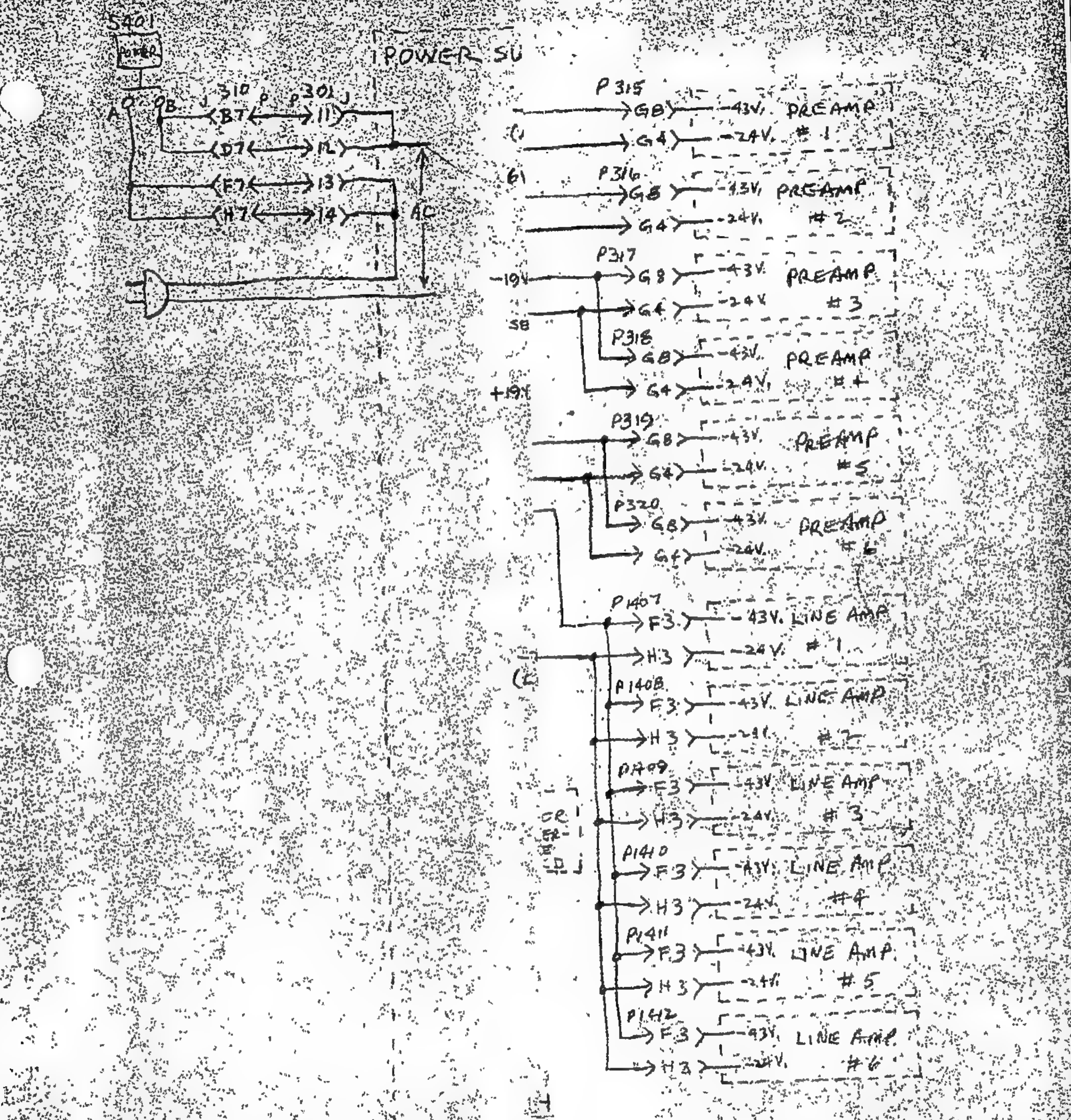
FIGURE 6-2

SC-0002

ADDED R1924-1 & -2; MPS A64 WAS 2N3702 (Q1601 & Q1602) 7/30/79

S1401-06 WAS S1601-06 8/10/79

R1601 & R1603 WERE 27K



...TIC, POWER DISTRIBUTION SYSTEM

...URE 6-4

SC-0004

4.6.3.2 (3)

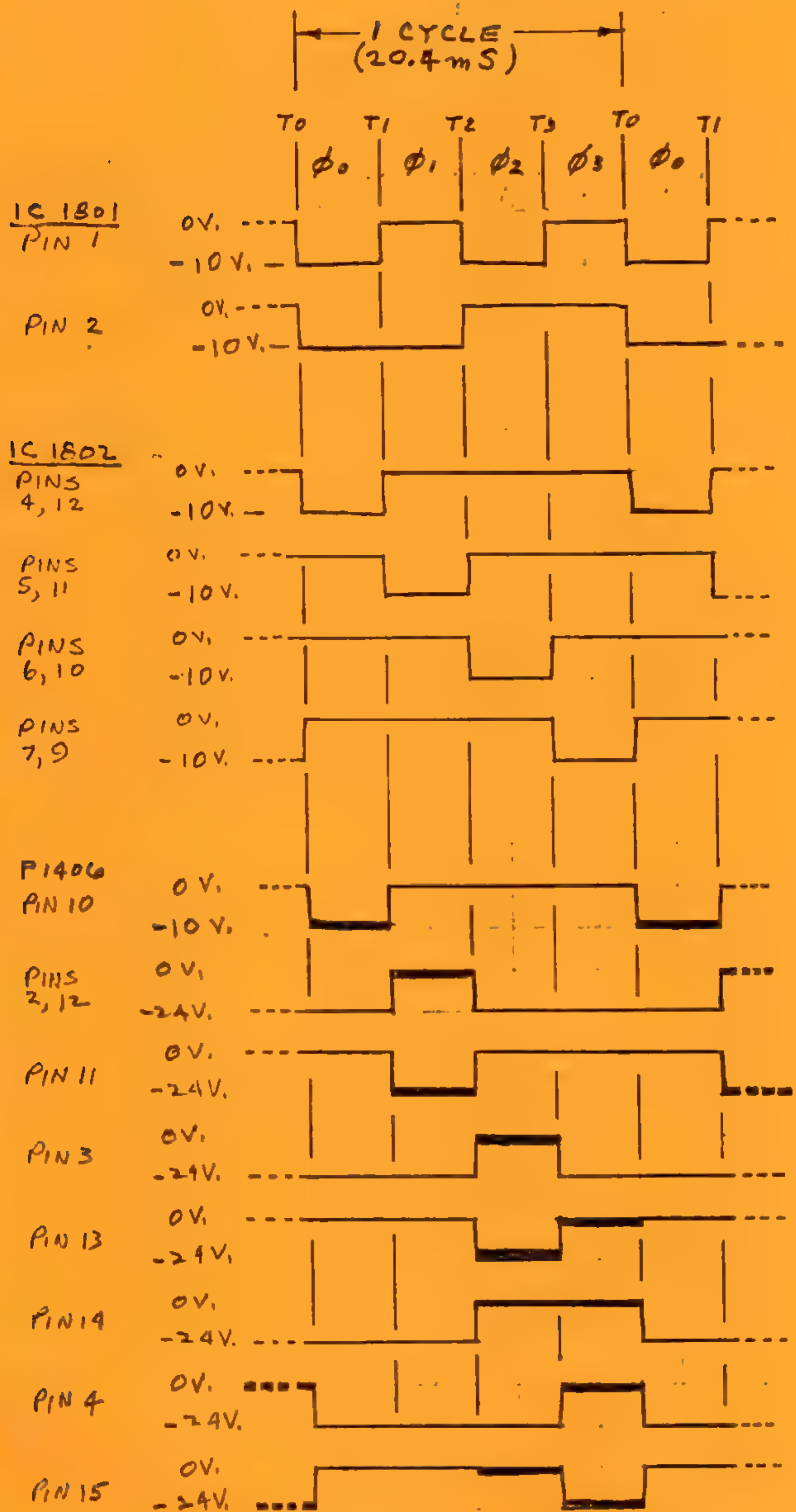
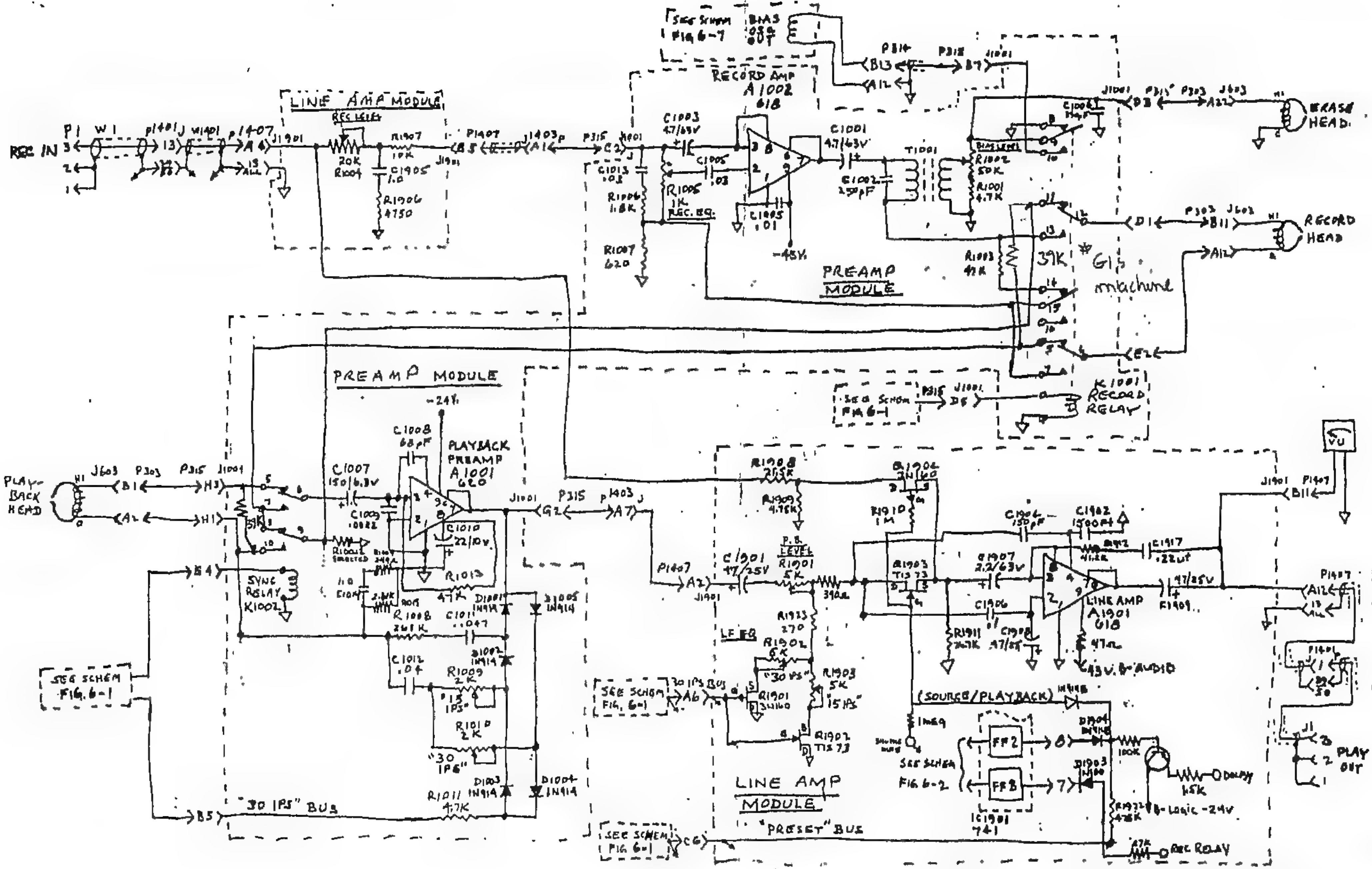


Figure 4.6-2. Multiplex Timing Diagram.



SCHEMATIC, RECORD AND PLAYBACK SYSTEM
FIGURE 6-3

SC-0003

7/30/79 PB Rev 6/1/82

IMACON SCANNER PRECISION II FR   ADAPTIVE light

When CROPING INCLUDE A SMALL LINE OF clear emulsion ON ALL 4 edges

LOOK AT PAGE 3-6 OF YOUR MANUAL
READ "DPI" Therefor, UNDEMINE please
width + height DON'T Matter. DO NOT LOCK
USE DPI + ZOOM TO SET YOUR FILESIZE see 4-12 + 5-2
see page 3-16 SETUPS

NO X

3-20 AdapTIVE LIGHT - histogram   Adaptive LIGHT - YES
3-22 ... APPLY   ENHANCED ... - YES
3-24 color correction - NO
3-26 AUTO TAB - NO   Keep CAST BUTTON ✓
3-28 DOT TAB - endpoints, Roundoff ; 240 for Highlights, ∅ for shadow
3-29 MONITOR -
3-38 HISTOgram WINDOW
3-44 Later I would like to Try shadow depth tests
4-12 true optical Resolutions   60 X 60 mm 3200 DPI MAX

ONCE setup is complete, click on New button.
+ save it with a name. pg 3-16 + 3-18

TRY RGB drumlike
USE RGB standard
scratch ON FILM 6611

TRY! 320 DPI
10" X 10"

TO split RGB INTO YB
ALT I+M IMAGE + MODE + MUTICHANNEL
ALT W+L+H WIN + channels
Move #3 TO TOP
TRASH #1 + #2
...

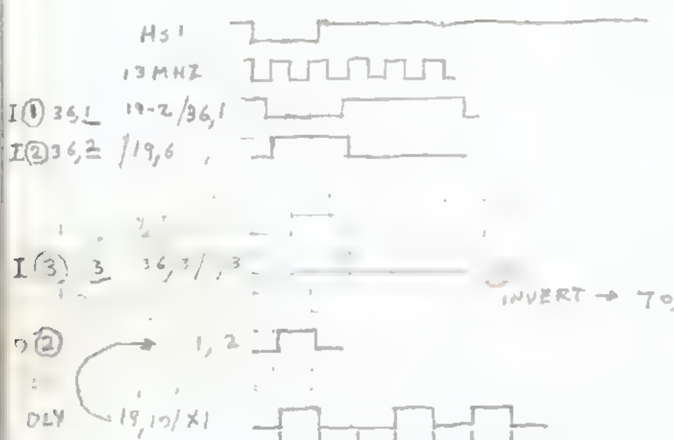
2400 X 2400 X 3 = 17.28 M = LATEST 6611
4100 X 4100 = 16.81 M

5,61 5,70

TRUE OPTICAL RESOLUTIONS { 3200 X 3200 = 10.24M
3200 X 3200 X 3 = 30.72M
1600 X 1600 X 3 = 7.68 M

... 2.15
2.11 2,17

8000 PIXEL CCD

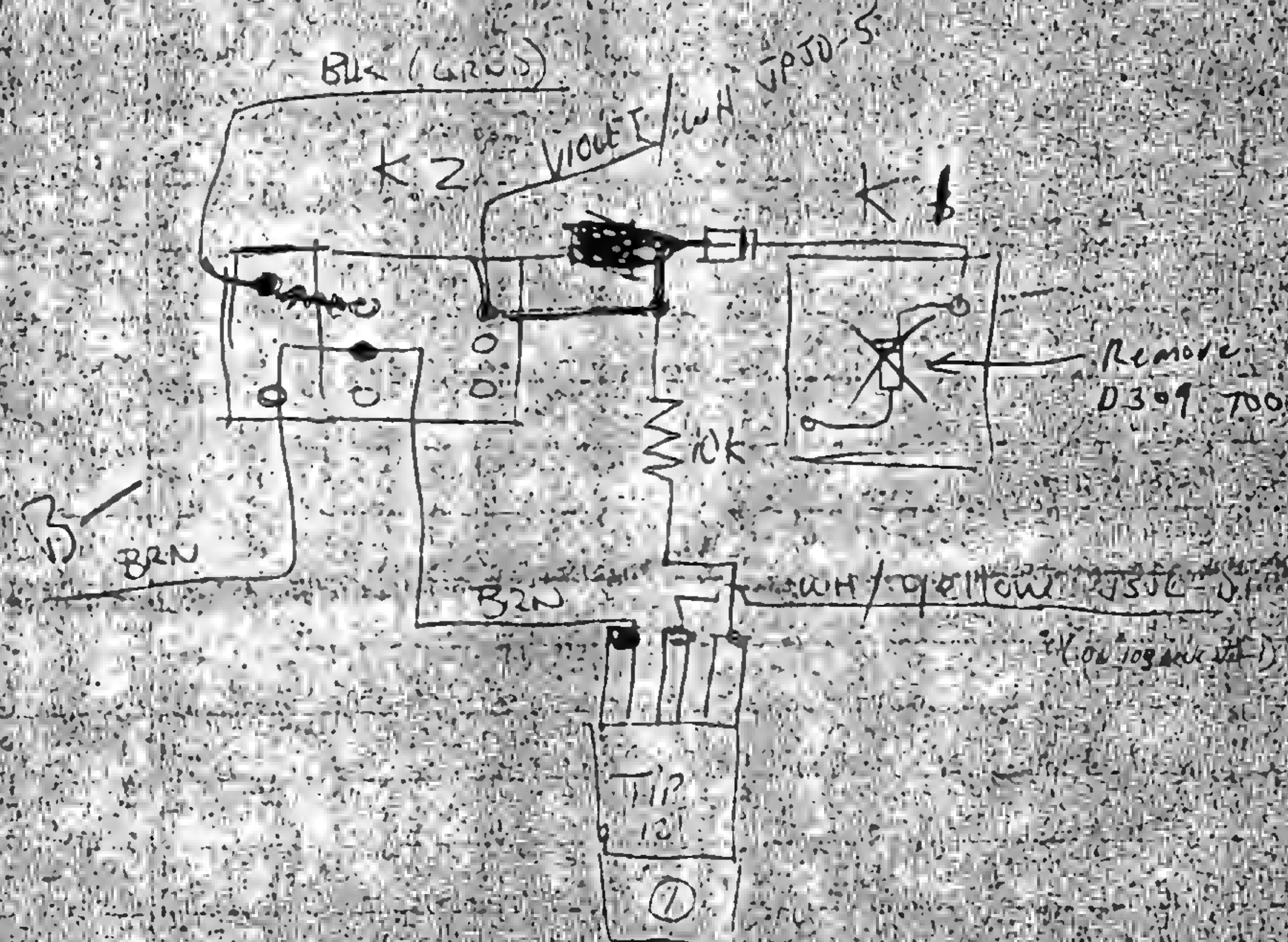


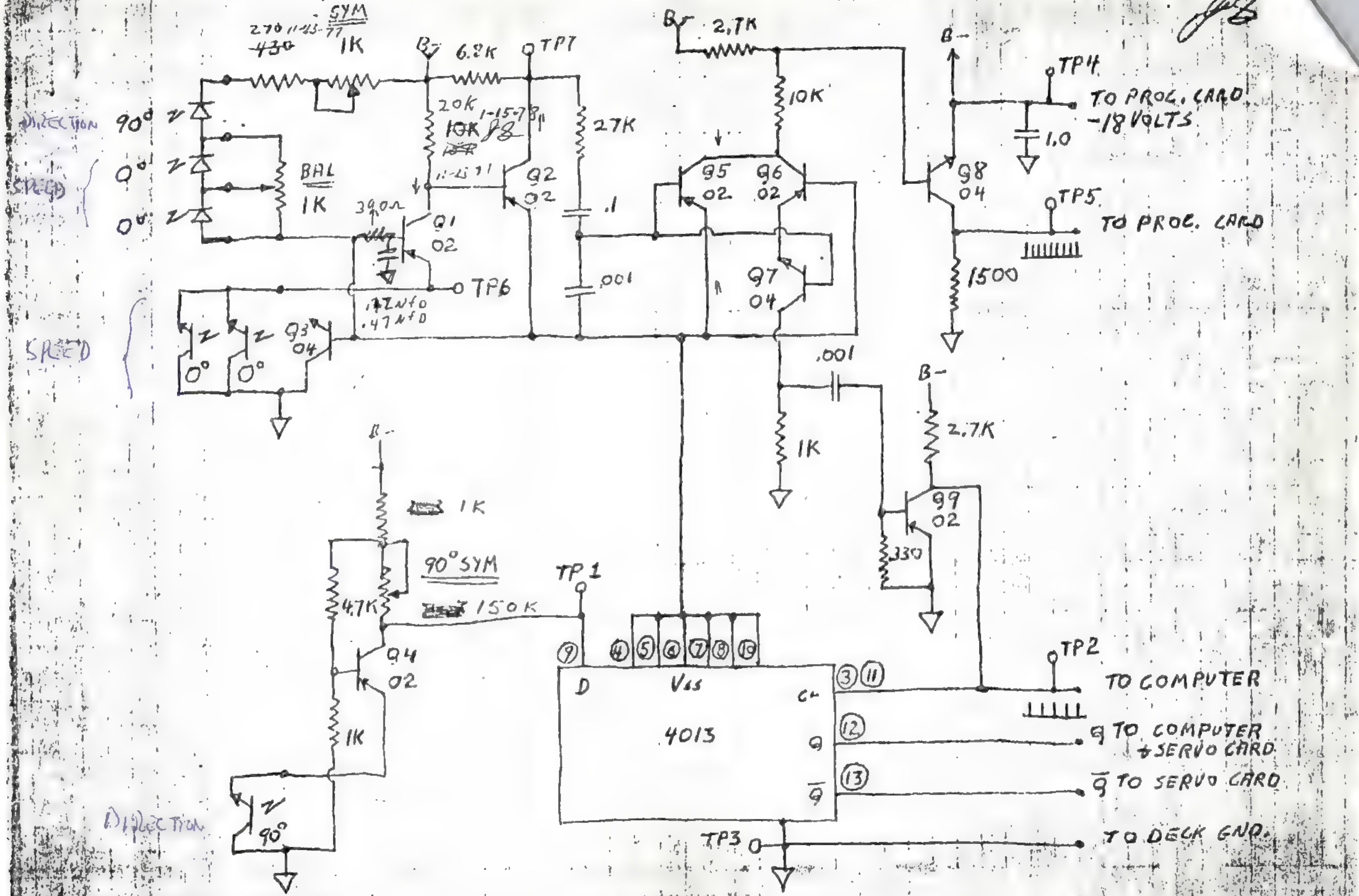
100 332 ... 1/8W 03

50 ECU-S1H105KBB 1,33

E:\NASA\APOLLO11\2ND6611
...
= 4130X
6611BY2TB.TIF cropped -

JACK - C:\ACROBAT ... Read16\ACRORD16.EXE


BLK (GRND)
VIOLET / WH VPJU-5
K2
K1
Remove
D309 700
10K
B
BRN
BRN
WH / yellow
TIP
121



AUDIO ARTS
SERIAL #1045

STEPHENS ELECTRONICS, INC

3513 PACIFIC AVENUE, BURBANK, CALIFORNIA 91505
PHONE: (213) 842-5116

SENSOR ALIGNMENT

For the following procedure, the operator should be knowledgeable about the use of an oscilloscope. Be sure to ground the scope to the chassis of the machine before starting the alignment procedure.

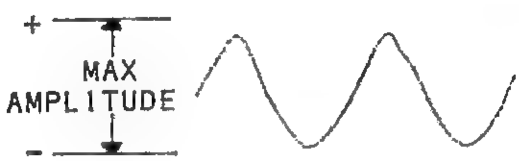
1. Remove head shield carriers to get access to sensors.

2. Center SYM and 90 SYM pots.

3. Connect scope to TP 6, and set for .02 volts/div., internal positive trigger.

4. Rotate BAL pot fully clockwise. With tape loaded, and deck in play mode, adjust Sensor 2 for maximum amplitude with minimum amplitude variation.

> WARNING: Use extreme caution when adjusting sensors not to hit the encoded disk. Hitting the disk with a screwdriver or the inner surface of the sensor can cause permanent damage to the disk.



5. Rotate BAL pot fully counter clockwise. With the same above conditions, adjust Sensor 1 for maximum amplitude with minimum amplitude variation.

When completed, both sensor assemblies should be pointing toward the center of the drum shaft.

6. Center BAL pot. Rotate Sensor 1 and BAL pot for minimum amplitude on scope. Increase gain of scope for accuracy if necessary. Deck may run wild.

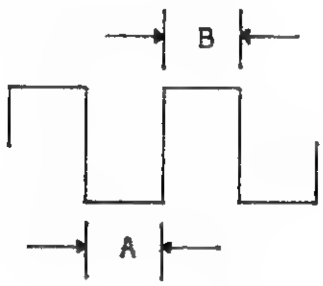
Do not readjust BAL pot for the rest of the alignment procedures.

VARIATION

7. Rotate Sensor 1 slightly for maximum amplitude with minimum amplitude variations.

This completes alignment of Sensors 1, 2 and the BAL pot.

8. Connect scope to TP 7. With deck in play mode adjust scope for display of square wave. Adjust SYM pot for symmetry of the square wave.



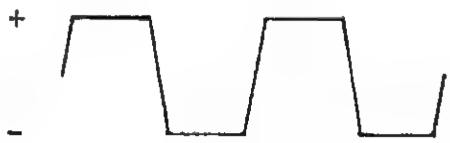
A=B

9. Connect scope to TP 5. Adjust scope for positive trigger. Reduce gain and adjust sweep for a display of four pulses. The first pulse should be at the start of the trace. Pulses two and three should be closely spaced together at the center of the screen with the fourth pulse at the far right side.

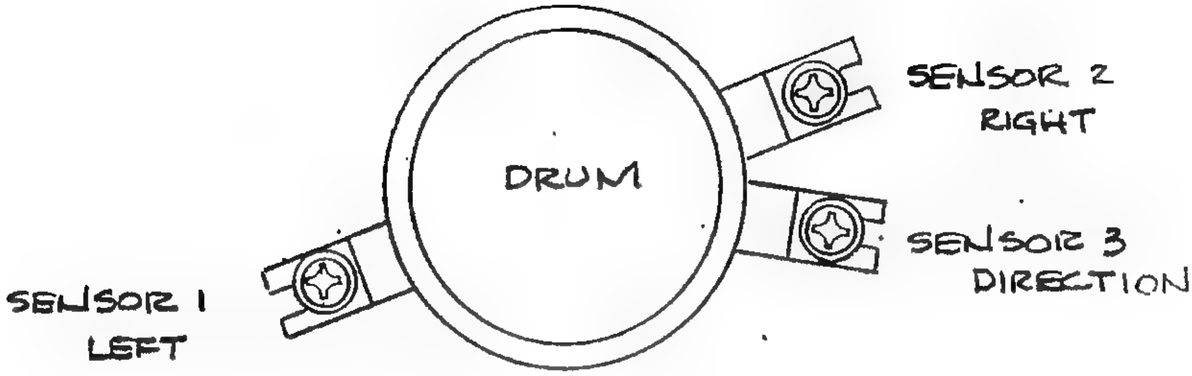
Adjust SYM pot so that pulse two is aligned on top of pulse three.

This completes alignment of the SYM pot.

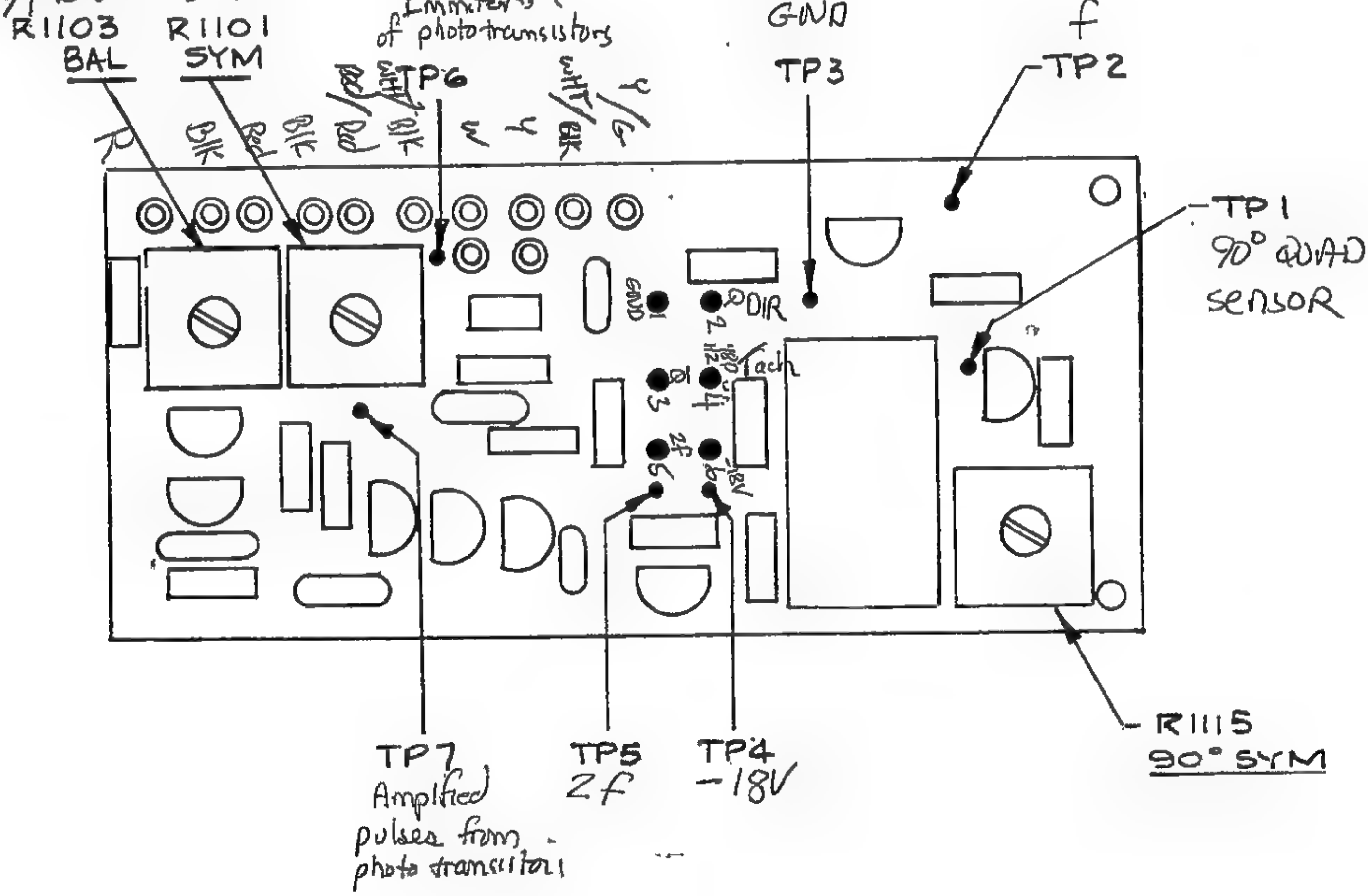
10. Connect scope to TP 1. With deck in play mode, adjust scope to display waveform. Adjust Sensor 3 for maximum amplitude with minimum amplitude variation. Adjust 90 SYM pot for symmetry of waveform.

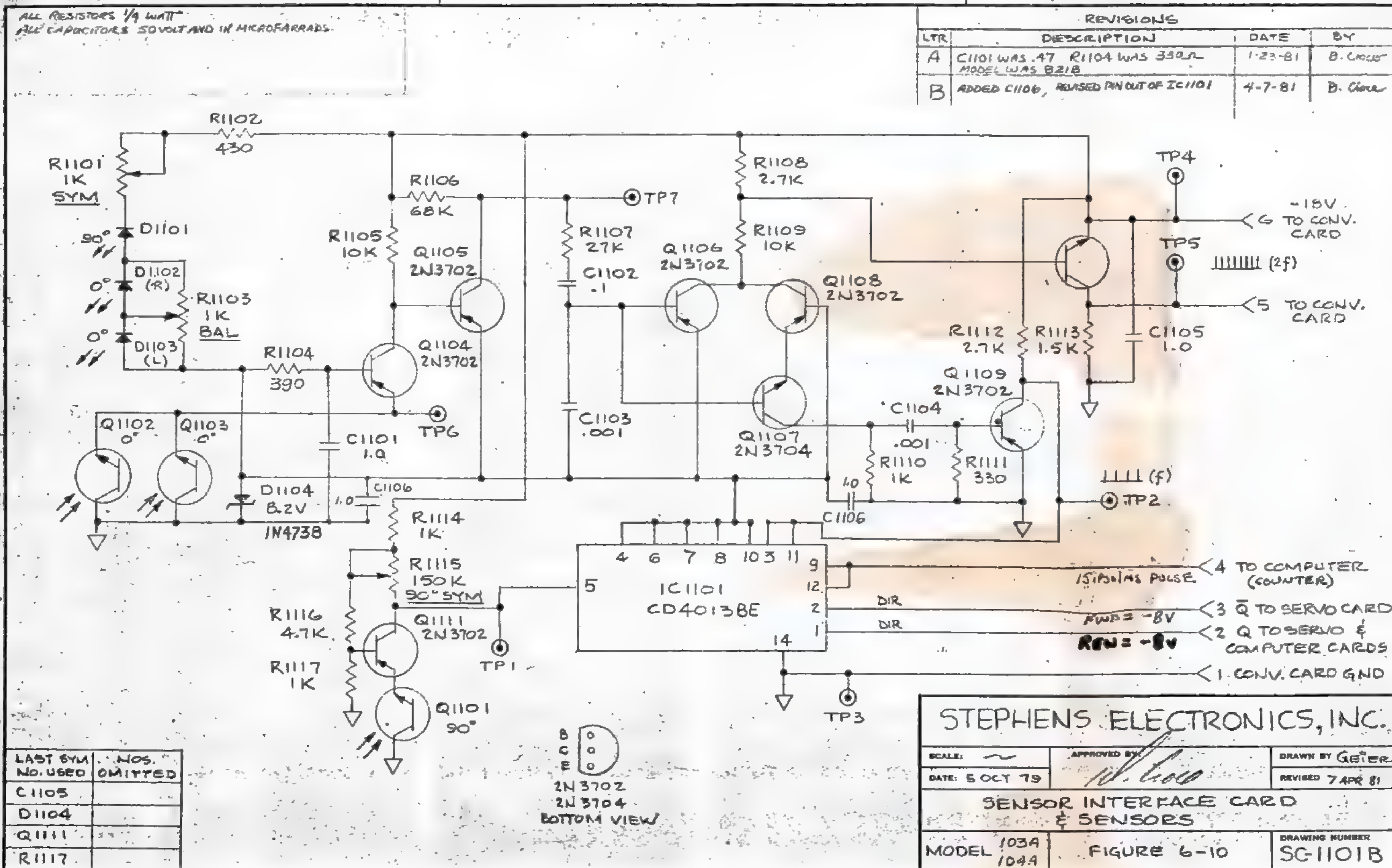


11. Connect external trigger of scope to TP 2. With deck in play mode, switch scope to external positive trigger. Adjust trigger for a stable pattern.



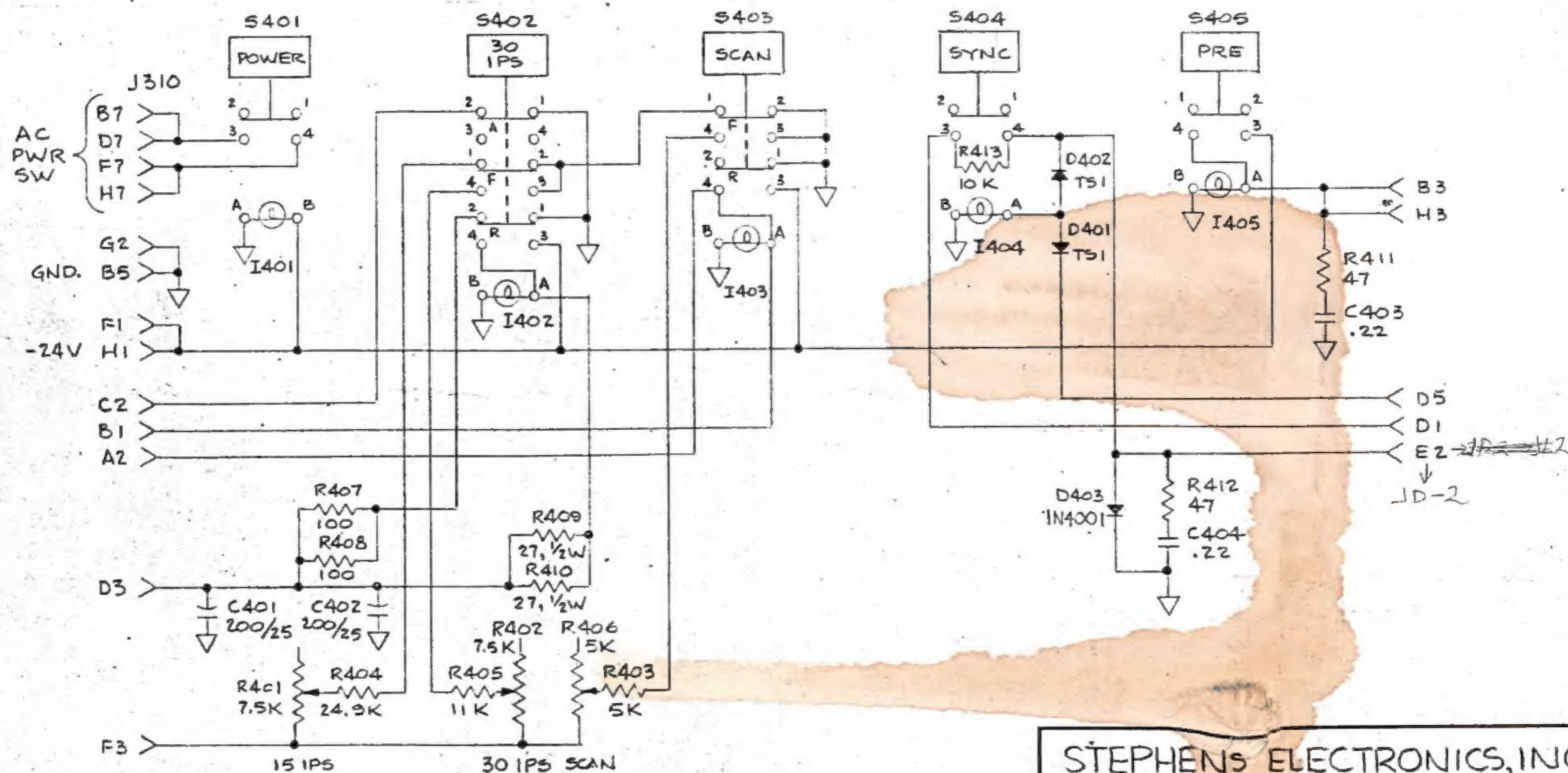
Old	New	
white	Black = Cathode	Led
Red	Red = Anode	
Black	WHITE = COLLECTOR	Phototransistor
Green	Yellow = Emitter	





ALL RESISTORS 1/4 WATT
ALL CAPACITORS 50 VOLT AND IN MICROFARRADS
REVISIONS
LTR | DESCRIPTION | DATE | BY
A | C1101 WAS .47 R1104 WAS 330Ω MODEL WAS B218 | 1-23-81 | B. Cioce
B | ADDED C1106, REVISED PIN OUT OF IC1101 | 4-7-81 | B. Cioce
R1101 1K SYM
R1102 430
D1101
D1102 (R)
D1103 (L)
R1103 1K BAL
R1104 390
R1105 10K
R1106 68K
Q1105 2N3702
Q1104 2N3702
TP6
TP7
R1107 27K
C1102 .1
C1103 .001
Q1106 2N3702
R1108 2.7K
R1109 10K
Q1108 2N3702
Q1107 2N3704
TP4
-18V
6 TO CONV. CARD
TP5
(2f)
5 TO CONV. CARD
R1112 2.7K
R1113 1.5K
C1105 1.0
Q1109 2N3702
C1104 .001
R1110 1K
R1111 330
(f)
TP2
Q1102 0°
Q1103 0°
C1101 1.0
D1104 8.2V 1N4738
C1106 1.0
R1114 1K
R1115 150K 90° SYM
R1116 4.7K
R1117 1K
Q1111 2N3702
TP1
Q1101 90°
IC1101 CD4013BE
4 6 7 8 10 3 11 9 12 2 1 14 5
4 TO COMPUTER (COUNTER)
15 IPS 10 MS PULSE
DIR
3 Q̄ TO SERVO CARD
FWD = -8V
2 Q TO SERVO & COMPUTER CARDS
REV = -8V
1 CONV. CARD GND
TP3
B C E
2N3702
2N3704
BOTTOM VIEW
LAST SYM NO. USED | NOS. OMITTED
C1105
D1104
Q1111
R1117
STEPHENS ELECTRONICS, INC.
SCALE: ~
APPROVED BY
DRAWN BY GEIER
DATE: 5 OCT 79
REVISED 7 APR 81
SENSOR INTERFACE CARD & SENSORS
MODEL 103A 104A
FIGURE 6-10
DRAWING NUMBER SG1101B

LTR	REVISIONS DESCRIPTION	DATE	BY
	MODEL WAS 821B		



LAST SYM NO. USED	NOS. OMITTED
C 404	
D 403	
R 413	

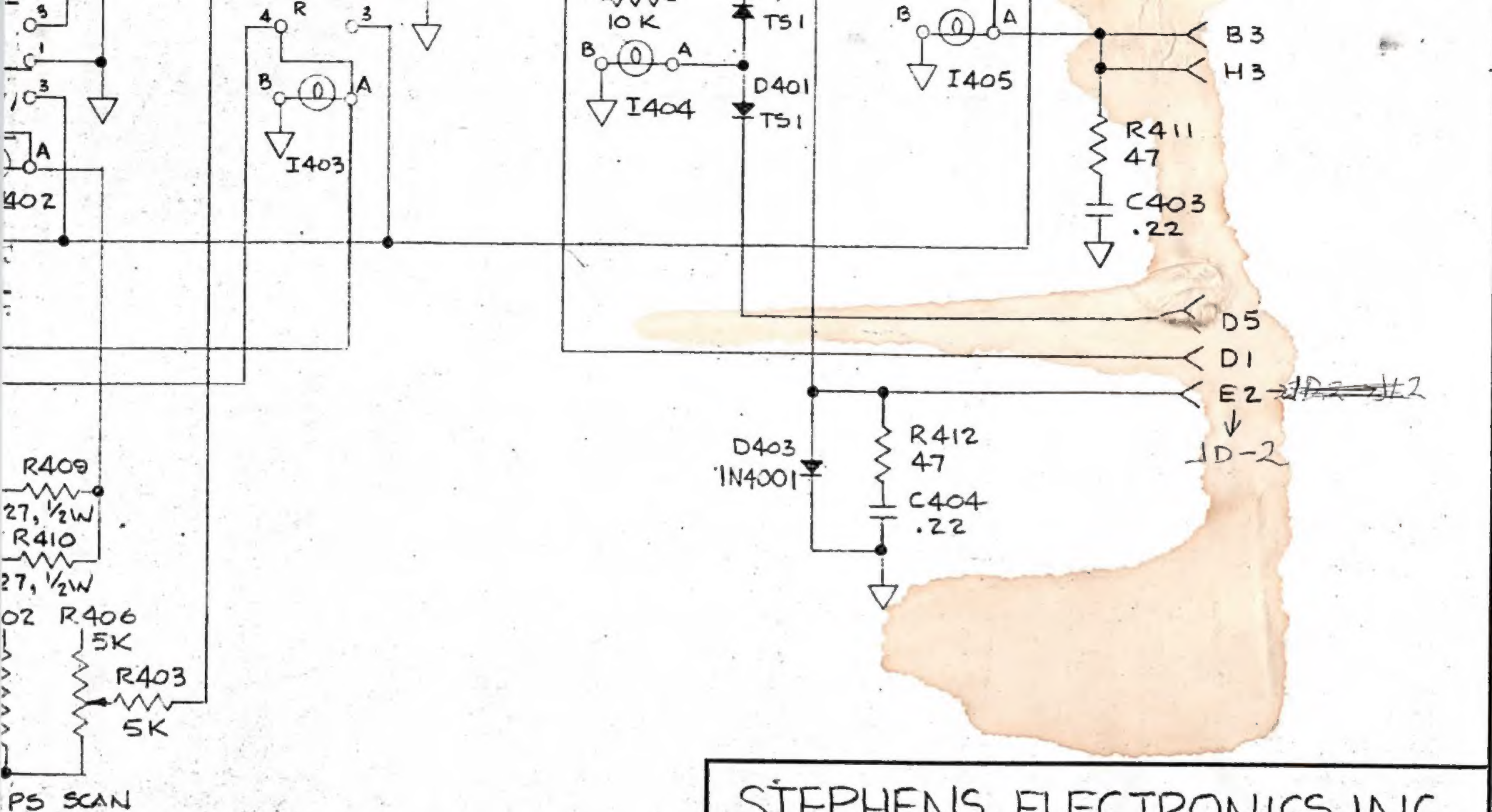
STEPHENS ELECTRONICS, INC.

SCALE: ~ | APPROVED BY: | DRAWN BY GEIER

DATE: 27SEP 79 | REVISED

STATIC CONTROLS MODULE

MODEL 103A 104A | FIGURE 6-18 | DRAWING NUMBER SC-0401



STEPHENS ELECTRONICS, INC.

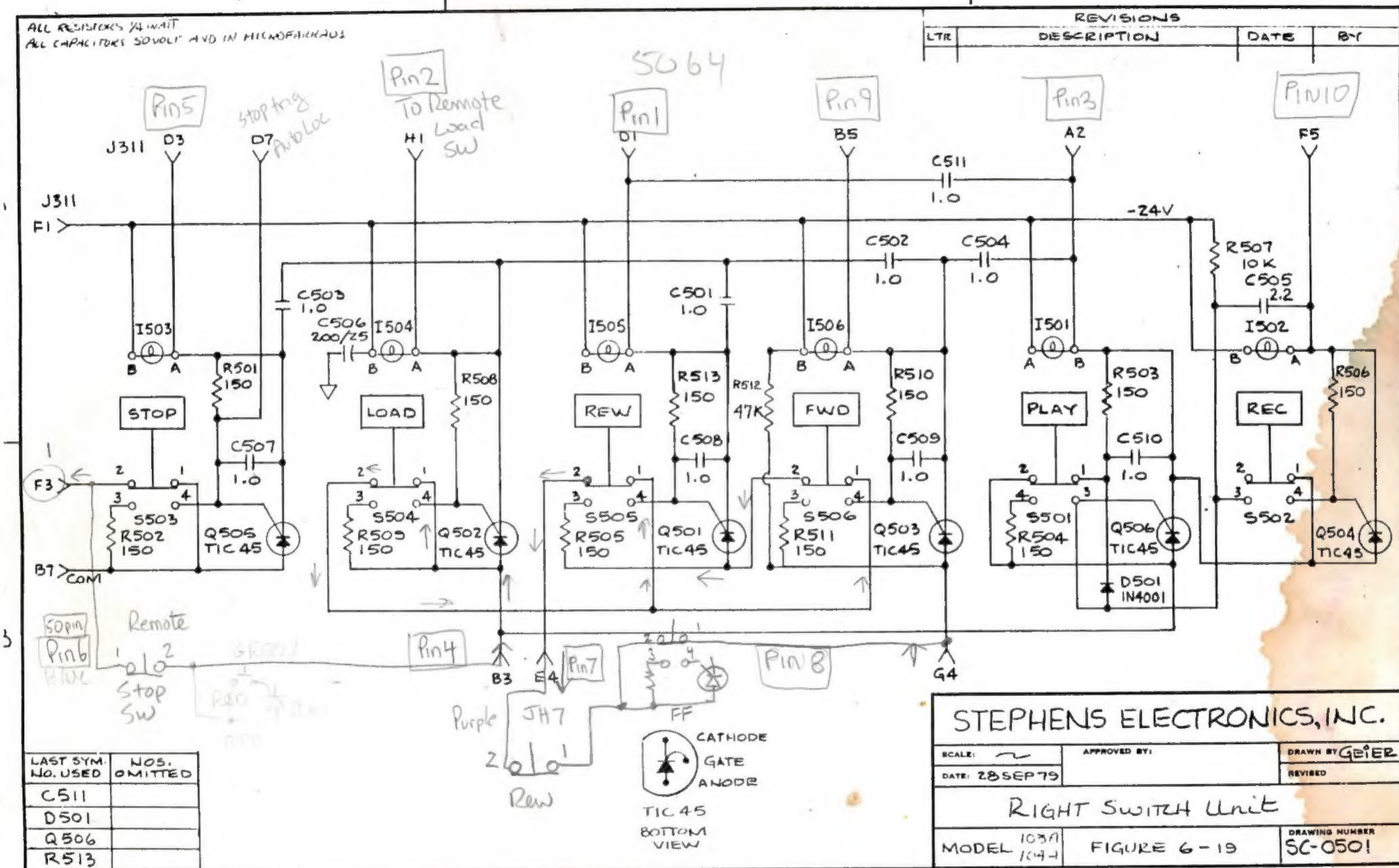
SCALE: ~	APPROVED BY:	DRAWN BY GEIER
DATE: 27SEP 79		REVISED

STATIC CONTROLS MODULE

MODEL 103A / 104A	FIGURE 6-18	DRAWING NUMBER SC-0401

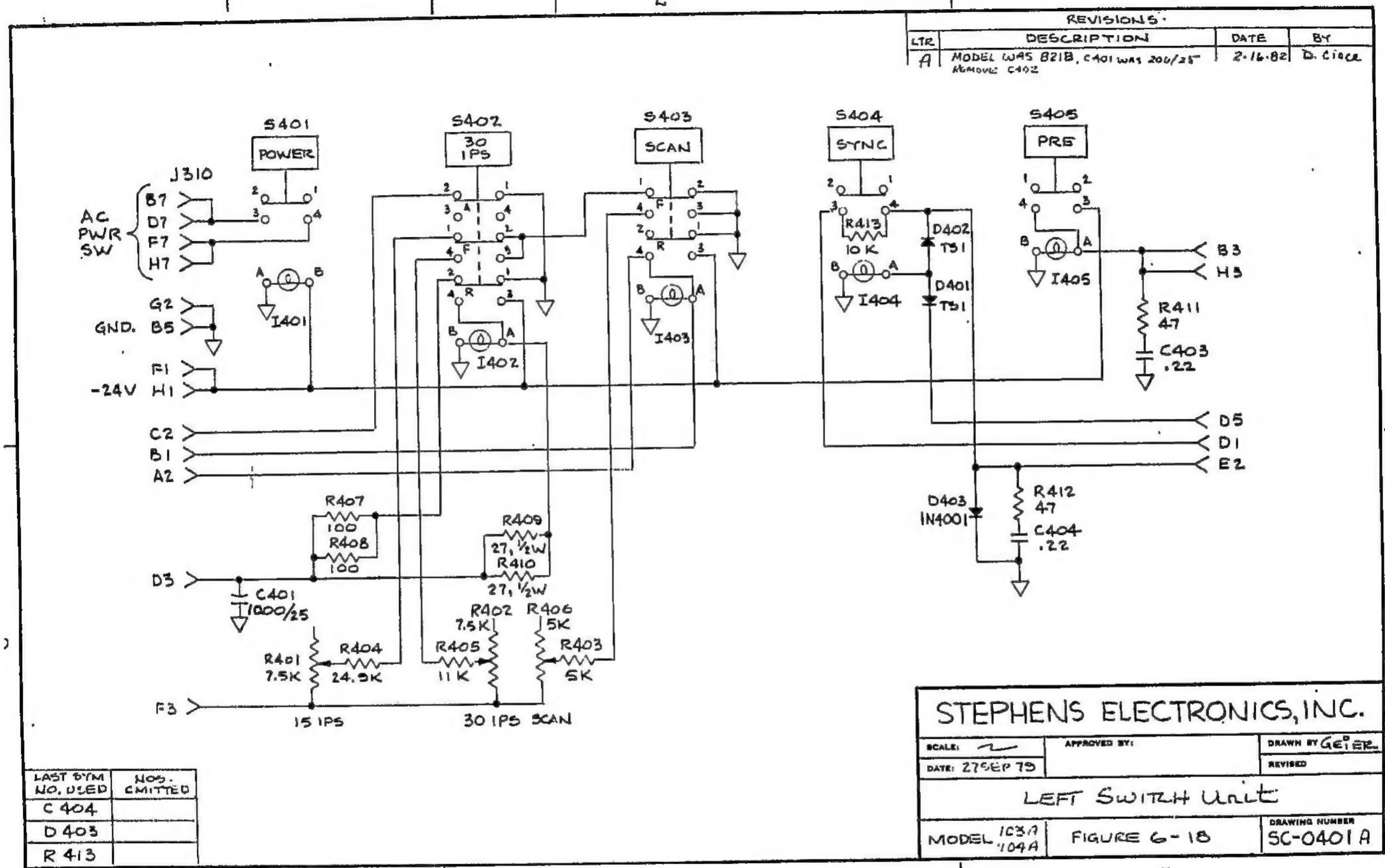
2 3

818 - 9801358



LAST SYM. NO. USED	NOS. OMITTED
C511	
D501	
Q506	
R513	

11E13 PRINTED ON NO. 1000H CLEARPRINT


REVISIONS
LTR
DESCRIPTION
DATE
BY
A
MODEL WAS 821B, C401 WAS 200/25
REMOVE C402
2-16-82
D. Ciace
S401
POWER
S402
30 IPS
S403
SCAN
S404
SYNC
S405
PRE
J310
AC PWR SW
B7
D7
F7
H7
I401
G2
GND. B5
F1
-24V H1
C2
B1
A2
I402
I403
R413
10K
D402
T51
D401
T51
I404
I405
B3
H5
R411
47
C403
.22
D5
D1
E2
R407
100
R408
100
R409
27, ½W
R410
27, ½W
D3
C401
1000/25
R401
7.5K
R404
24.5K
R405
11K
R402
7.5K
R406
5K
R403
5K
F3
15 IPS
30 IPS
SCAN
D403
IN4001
R412
47
C404
.22
STEPHENS ELECTRONICS, INC.
SCALE:
APPROVED BY:
DRAWN BY GEIER
DATE: 27 SEP 79
REVISED
LEFT SWITCH UNIT
MODEL 103A 104A
FIGURE 6-18
DRAWING NUMBER
SC-0401 A
LAST SYM NO. USED
NOS. OMITTED
C 404
D 403
R 413
PRINTED ON NO. 1000H CLEARPRINT